# ATTACHMENT D

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | |
|---|---|
| ZITO CANTON, LLC,<br><br>*Complainant*,<br><br>v.<br><br>PPL ELECTRIC UTILITIES CORPORATION,<br><br>*Respondent*. | Proceeding No. 17-284<br>File No. EB-17-MD-005 |

## DECLARATION OF KELLY RAGOSTA

I, KELLY RAGOSTA, declare as follows:

1. I serve as Commercial Services Project Manager for Zito Canton, LLC ("Zito"), with a general office address of 102 South Main Street, Coudersport, PA 16915. I make this Declaration in support of Zito's Amended Pole Attachment Complaint in the above-captioned case. I know the following of my own personal knowledge, and if called as a witness in this action, I could and would testify competently to these facts under oath.

2. I have been employed by Zito for seven years, and served as Zito's Commercial Services Project Manager for four years. In this role, I am responsible for coordinating Zito's pole attachment applications and for reviewing, managing and paying all of the Zito's pole attachment invoices, including but not limited to those stemming from attachment to poles owned by PPL Electric Utilities Corporation ("PPL").

3. I have reviewed the allegations made in the Pole Attachment Complaint filed in this proceeding as well as the exhibits attached hereto, and verify that they are true and correct to the best of my knowledge, information and belief.

4. PPL invoices Zito for "Make Ready – Engineering" and "Make Ready – Construction." Attached as **Exhibit 1** is a representative example of a PPL invoice.

5. Upon information and belief, PPL's "Make Ready – Engineering" charges include charges for third party contractors engaged by PPL to perform an extensive pre-attachment inspection process, which includes a field survey of the poles included in Zito's applications and any make-ready design work that PPL's contractor determines is required. The survey and make-ready design work are not performed by the same contractor.

6. The field survey conducted by PPL's third-party contractor (currently, Stine Consulting) collects extensive information about the poles including information concerning PPL's and other entities' facilities attached to the poles. The contractor takes multiple photos of each pole, as well as the surrounding area, and adjacent mid-spans, and maps each pole onto a Google-earth-like interactive map, which is uploaded to a PPL portal site designed by Katapult Engineering. The portal contains electronic profiles of the poles, including metadata such as GPS coordinates. Attached at **Exhibit 2** are screenshots that I created from the PPL portal on October 10, 2017, demonstrating how the data collected by PPL's third-party contractor is integrated into the PPL portal. After the field survey of the poles is completed, another third party contractor hired by PPL analyzes the survey information and determines what make-ready work is required. Upon information and belief, PPL directs its third party contractors to conduct a full pole loading analysis for every pole in Zito's applications.

7. PPL's invoices for "Make Ready – Engineering" and "Make Ready – Construction" list only lump sum charges in these two categories for all poles on the application; they do not list the charges related to specific tasks.

8. PPL's invoices for "Make Ready – Engineering" do not provide sufficient detail for Zito to assess what tasks are being performed, whether the work is necessary to accommodate its attachments, or whether the associated charges are reasonable. Upon information and belief, PPL charges Zito for the full cost of its contractors' pre-attachment survey and make-ready design, including a full loading analysis of every pole.

9. PPL's invoice charges for "Make Ready – Construction" do not provide essential information necessary to enable Zito to verify whether the proposed make-ready construction work is necessary to accommodate its attachments or whether the charges are reasonable. As shown in the representative invoice at **Exhibit 1**, PPL's invoices for "Make Ready – Construction" include only a lump sum estimate of the cost of make-ready work for all of the poles on an application and do not list the labor and material cost for the specific make-ready tasks to be performed on each pole.

10. Without information about the costs associated with specific make-ready tasks, Zito is unable to evaluate whether the make-ready work charges are reasonable and thus, whether to proceed with the work, consider a less costly alternative route, or whether other safe, yet more cost-effective solutions should be pursued.

11. The pre-attachment inspection and make-ready charges invoiced by PPL for its third-party contractors' services are significantly higher than charges imposed for similar work by other Pennsylvania pole-owning utilities and telecommunications providers.

12. On average, PPL's "Make Ready – Engineering" charge for survey and design is approximately $195.58 per pole. In 2017, to date, the per-pole average increased to $263.39. In numerous exchanges with PPL, Zito disputed these charges as unreasonable. They far exceed the amounts charged by other pole owners in Pennsylvania for the pre-attachment inspection process used to assess and design any required make-ready. The amount charged by other Pennsylvania investor-owned electric utilities and telecommunications companies for this process is, on average, $27.83 per pole.[1]

13. On an average per pole basis, PPL's charges for "Make Ready – Construction" are 58% higher than make-ready charges of other Pennsylvania investor-owned electric utilities and telecommunications companies. PPL's average per-pole charge for make-ready construction is $1,685, whereas the average per-pole charge of other Pennsylvania investor-owned electric utilities and telecommunications companies for make-ready work is $1,068. Because PPL has not provided Zito with the requested information to substantiate its invoices, Zito is unable to identify the precise charges per task that are excessive.

14. Upon information and belief, PPL charges for and requires Zito to pay to correct pre-existing non-compliant conditions on its poles even though such work would be required regardless of whether Zito attaches to the pole.

15. Zito has challenged the reasonableness of PPL's make-ready charges on numerous occasions.

16. PPL requires Zito to pay all "Make Ready – Engineering" in full regardless of whether the charges are the subject of a good faith dispute. PPL will not process any applications, including new, unrelated applications, unless and until Zito pays all outstanding "Make Ready –

Engineering" charges in full. *See* **Exhibit 4** (May 16, 2016 email from Ryan Yanek, PPL Project Manager, to me and Joe Laubach of Zito, stating that "after we receive payment for all outstanding invoices, we will resume work on your applications") and **Exhibit 5** (June 16, 2016 email from Ryan Yanek, PPL Project Manager, to me and Colin Higgin, et al., "confirming that after PPL receives the outstanding funds in its account, that we will resume processing applications").

17. In light of PPL's refusal to accept or process Zito's pole attachment applications without full payment of any questioned or disputed invoices, and given Zito's critical need for timely pole access to satisfy customer commitments and regulatory obligations, Zito paid in full and continues to pay in full the invoices sent by PPL, subject to a reservation of its rights to challenge the invoices and seek refunds from PPL. Attached at **Exhibit 6** is a spreadsheet of all disputed invoice charges by PPL and payments by Zito.

18. Zito repeatedly has requested that PPL provide additional detailed information to substantiate and support the charges in its invoices; however, to date, PPL has not provided Zito with the requested information.

19. My colleague, Todd McManus, and I participate in weekly calls with representatives of Zito and PPL to discuss ongoing issues concerning Zito's attachments to PPL's poles, including the pre-attachment inspection and make-ready design process and PPL's invoices to Zito. Zito has expressed its concerns about the pre-attachment inspection and make-ready design process to PPL on these calls and in prior correspondence between the parties and during mediation efforts at the FCC.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge.

By: Kelly Ragosta
Kelly Ragosta

Dated: November 13, 2017

# EXHIBIT 1

TWO NORTH NINTH STREET
ALLENTOWN PA 18101-1179

| QUOTE NUMBER | QUOTE DATE | TOTAL AMOUNT |
|---|---|---|
| 81015761-3 | 09/05/17 | 40,755.32 |

ZITO CANTON, LLC
KARINA VALENTI
102 SOUTH MAIN STREET
COUDERSPORT, PA 16915

PPL CONTROL ACCOUNT: 014330

MAKE CHECKS PAYABLE TO:
PPL Electric Utilities Corp

AMOUNT PAID

--- 3 10004075532000407553 26 8101576100

TO INSURE PROPER CREDIT, PLEASE RETURN THIS PORTION WITH PAYMENT IN ENCLOSED ENVELOPE TO: PPL CORPORATION PO BOX 25222 LEHIGH VALLEY, PA 18002-5222

ZITO CANTON, LLC
KARINA VALENTI
102 SOUTH MAIN STREET
COUDERSPORT, PA 16915

REFER ALL INQUIRIES TO:
Customer Care Center 610-774-4465

PLEASE REFER TO THIS NUMBER WHEN
CALLING OR WRITING: 81015761-3

| ITEM | DESCRIPTION | AMOUNT |
|---|---|---|
| 1 | MAKE READY - CONSTRUCTION | 26,845.00 |
| 2 | MAKE READY - ENGINEERING | 13,910.32 |
| | 58208027 - MR-601-ZITO CANTON, LLC-APP<br>204408-CLINTON CO PSAP (112-74) | |
| | Payment Due: Upon Receipt | |

| QUOTE NUMBER | QUOTE DATE | TOTAL AMOUNT |
|---|---|---|
| 81015761-3 | 09/05/17 | 40,755.32 |

PPL Electric Utilities Corp
TWO NORTH NINTH STREET, ALLENTOWN, PA 18101-1179
054570000000009

# EXHIBIT 2

APP_204410

54 of 54 poles


Limestone Run

Limestone Run

003

002

001

000

000.A

218.9'

194.1'

193.6'

21'

260.5'

Elementary School Rd

James F Baugher Elementary School

Skyview Dr

Skyview Dr

Skyview Dr

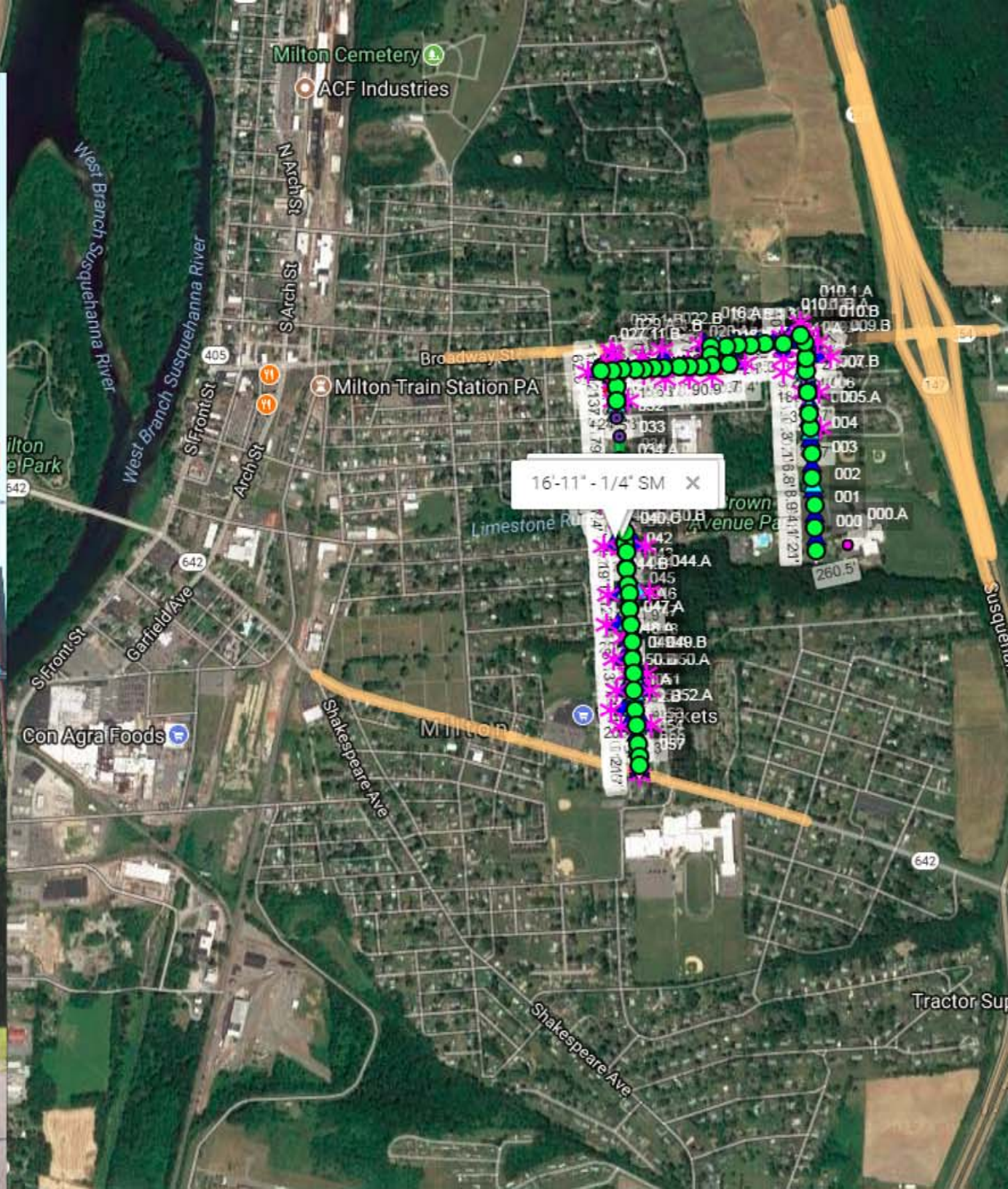
Skyvie

Google

Hybrid

Measure

54 of 54 poles

# EXHIBIT 3

-------- Forwarded Message --------
**Subject:**Zito Outstanding Invoices - Notification from PPL
**Date:**Mon, 16 May 2016 16:38:31 -0400
**From:**Yanek, Ryan J <RJYanek@pplweb.com>
**To:**Kelly Ragosta <kelly.ragosta@zitomedia.com>, joe.laubach@zitomedia.com <joe.laubach@zitomedia.com>
**CC:**Silverio, Jose E <JESilverio@pplweb.com>

Greetings Kelly and Joe,

I am writing to inform you that, effective today, PPL will not be processing any new applications for attachment to our facilities for Safety, Reliability and Engineering reasons.

Zito has demonstrated that it is not a responsible / safe attacher, through non-payment for Engineering services rendered by PPL and its contractors.

Because of Zito's actions, we will be rejecting or placing on hold other applications until we receive payment for work we performed at your request.

We had our first call discussing Zito's questions of PPL's Make Ready Engineering charges on March 7th, 2016.

We received your letter March 17th and we replied on April 5th. We have not yet received a response from you.

During this time between March 7th and today May 16th, we have continued processing approximately 13 applications in good faith, but can not continue expending our resources with such a large outstanding balance.

As we said in our April 5th letter, we are willing to discuss Zito's concerns about PPL's engineering and design charges, but the proper course established by the FCC is for Zito to pay the invoices and then seek refunds from PPL and, if necessary, the Commission. In accordance with FCC precedent, PPL expects Zito to make this payment before meaningful discussions can take place.

Attached to this email is an Excel File which lists the status of each of the following categories of

jobs:

1) Applications where Engineering has been performed, but Zito has cancelled prior to Construction, and hasn't paid PPL

2) Applications which will be placed on hold where data collection and engineering are complete, Construction has been scheduled, but not started and Zito has Paid

3) Applications where Engineering was performed, invoice sent and paid, but Zito Cancelled construction before it started

4) Applications which will be placed on hold, data collection complete engineering not started

5) Applications which will be rejected today

The invoices in Category 1) are long overdue. We are currently owed $351,049.48.

The jobs in Category 2) are paid for, but we are not moving forward with execution in an effort to limit our overall liability. $24,608.09

The jobs in Category 3) are paid for, but we are not moving forward with execution in an effort to limit our overall liability. $32,993.30

The jobs in Category 4) have not been invoiced as an estimate was not yet generated. $22,160.00

The Applications in Category 5) do not have a monetary impact because they were not yet started.

Please work with your company to process these invoices and provide me with a timeline when we can expect payment. After we receive payment for all outstanding invoices, we will resume work on your applications.

Thank you for your attention to this matter.
Sincerely,

**Ryan J. Yanek, PMP | Project Manager - ATBS**
Distribution Asset Management | **610-774-2092 (Desk)** | 610-509-6866 (Cell)| ryanek@pplweb.com

PPL EU
2 North 9th St.
GENN3
Allentown, PA 18101

# EXHIBIT 4

**From:** Yanek, Ryan J [mailto:RJYanek@pplweb.com]
**Sent:** Thursday, June 16, 2016 3:33 PM
**To:** Kiser, Chérie R.; colin.higgin@zitomedia.com; Kelly Ragosta; 'Gerry Kane'
**Cc:** Gelatko, Stephen J; Shafer, Michael J; magee@khlaw.com; Silverio, Jose E
**Subject:** Zito Outstanding Invoices - Update from PPL

Good Afternoon All,

Per our discussions on the conference call this morning , I am providing you with an updated version of my 5/16/16 spreadsheet to summarize the status of Zito's Applications as well as illustrate the value Zito must pay PPL, before PPL will resume processing their applications.

The summary shown on the attached spreadsheet is as follows:
The Outstanding total for invoices where PPL performed work and Zito has not yet paid is $351, 049.48, shown in the attached document as Category 1). By applying the refund due to Zito for Applications cancelled after payment has been received in the amount of $32,993.30(Category 3) and check 26491 in the amount of $50,000.00 (Category 8), the remaining outstanding balance is $268,056.18 .

Other categories of invoices are shown in the attached spreadsheet for the purpose of showing overall status of applications and invoices with Zito, but do not factor into the outstanding balance above.

Please review the attached document for details supporting these values, and advise when PPL will receive payment for this amount.

After PPL receives the check from Zito and recognizes the funds in its account, we will resume processing existing jobs which were on hold and will notify Zito to re-submit / submit new applications for processing.

Sincerely,

**Ryan J. Yanek, PMP | Project Manager - ATBS**
Distribution Asset Management | **610-774-2092 (Desk)** | 610-509-6866 (Cell)| rjyanek@pplweb.com

PPL EU
2 North 9th St.
GENN3
Allentown, PA 18101

5/16/16 Status 1) Applications where Engineering has been performed, but Zito has cancelled prior to Construction, and hasn't paid PPL

6/16/16 Status 1) Applications where Engineering has been performed, but Zito has cancelled prior to Construction, and hasn't paid PPL

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice# | Invoice Amount | Invoice Sent Date |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | 800 Lititz Pike - App 1 | 202126 | 15008428 | 58006937 | Lancaster | Lancaster | Lancaster City & Manheim Twp, Lancaster Co | 79 | 81011108 | $15,722.00 | 2/17/2016 |
| Zito Canton, LLC | 800 Lititz Pike - App 2 | 202127 | 15008431 | 58006877 | Lancaster | Lancaster | Manheim Twp & Lancaster City, Lancaster Co | 100 | 81011109 | $18,305.00 | 2/17/2016 |
| Zito Canton, LLC | 800 Lititz Pike - App 3 | 202128 | 15008432 | 58006876 | Lancaster | Lancaster | Manheim Twp, Lancaster Co | 94 | 81011110 | $16,509.00 | 2/17/2016 |
| Zito Canton, LLC | 800 Lititz Pike - App 4 | 202129 | 15008430 | 58006878 | Lancaster | Lancaster | Lititz Boro & Manheim Twp & Warwick Twp, Lancaster Co | 93 | 81011111 | $20,267.00 | 2/17/2016 |
| Zito Canton, LLC | 795 Noble Rd (Site 310) - App 1 | 202069 | 15009435 | 58012457 | Lehigh | Lehigh | Allentown City, Lehigh Co | 95 | 81010842 | $19,502.00 | 1/7/2016 |
| Zito Canton, LLC | 795 Noble Road (Site 310) - App 2 | 202170 | 15009436 | 58012458 | Lehigh | Bethlehem | Hanover Twp, Lehigh Co | 43 | 81010845 | $11,174.00 | 1/7/2016 |
| Zito Canton, LLC | Heller's Road & Tunkhannock Drive - App 1 | 202176 | 15009442 | 58012464 | Northeast | Pocono | Mount Pocono Boro & Paradise Twp, Monroe Co | 89 | 81011463 | $12,905.54 | 4/1/2016 |
| Zito Canton, LLC | Heller's Rd & Tunkhannock Drive - App 3 | 202178 | 15009444 | 58009555 | Northeast | Pocono | Tobyhanna Twp & Coolbaugh Twp & Mount Pocono Boro, Monroe Co | 99 | 81011464 | $14,741.76 | 4/1/2016 |
| Zito Canton, LLC | Heller's Road & Tunkhannock Drive - App 4 | 202179 | 15009445 | 58009553 | Northeast | Pocono | Tobyhanna Twp & Tunkhannock Twp, Monroe Co | 96 | 81011467 | $17,121.84 | 4/1/2016 |
| Zito Canton, LLC | Belmon Pike & Arnold St (Site 241) - App 1 | 202199 | 15010446 | 58015081 | Northeast | Pocono | Stroud Twp & Stroudsburg boro, Monroe Co | 99 | 81011028 | $14,648.40 | 2/2/2016 |
| Zito Canton, LLC | Belmon Pike & Arnold St (Site 241) - App 2 | 202200 | 15010448 | 58015082 | Northeast | Pocono | Stroud Twp, Monroe Co | 24 | 81011027 | $6,443.26 | 2/2/2016 |
| Zito Canton, LLC | 216 Friemann Road (Site 227) - App 2 | 202203 | 15010451 | 58015084 | Northeast | Pocono | Chestnuthill Twp, Monroe Co | 29 | 81011021 | $3,483.69 | 2/2/2016 |
| Zito Canton, LLC | 10th Street (Site 1) | 202229 | 15010887 | 58016391 | Lancaster | Lancaster East | Akron Boro & West Earl Twp, Lancaster Co | 100 | 81010601 | $19,160.00 | 11/26/2015 |
| Zito Canton, LLC | 27 E Main St (Site 83) | 202230 | 15010888 | 58016392 | Lancaster | Lancaster East | Ephrata Twp & Akron Boro & Ephrata Boro, Lancaster Co | 58 | 81010674 | $7,093.00 | 12/9/2015 |
| Zito Canton, LLC | 450 Fairview Ave (Site 237) - App 1 | 202251 | 15011792 | 58019709 | Lehigh | Lehigh | North Whitehall Twp, Lehigh Co | 97 | 81011115 | $23,317.00 | 2/17/2016 |
| Zito Canton, LLC | 450 Fairview Ave (Site 237) - App 2 | 202252 | 15011793 | 58019710 | Lehigh | Lehigh | North Whitehall Twp & Washington Twp, Lehigh Co | 94 | 81011112 | $15,194.00 | 2/17/2016 |
| Zito Canton, LLC | 450 Fairview Ave (Site 237) - App 3 | 202255 | 15011796 | 58019715 | Lehigh | Lehigh | Washington Twp & Slatington Boro, Lehigh Co | 100 | 81011113 | $20,376.00 | 2/17/2016 |
| Zito Canton, LLC | 1995 Leithoville Road (Site 112) - App 1 | 202333 | 15013300 | 58023311 | Lehigh | Bethlehem | Upper Saucon Twp, Lehigh Co | 96 | 81011022 | $19,236.00 | 2/3/2016 |
| Zito Canton, LLC | 1995 Leithoville Road (Site 112) - App 2 | 202334 | 15013302 | 58023312 | Lehigh | Bethlehem | Lower Saucon Twp, Northampton Co; Upper Saucon Twp, Lehigh Co | 59 | 81011020 | $14,824.00 | 2/3/2016 |
| Zito Canton, LLC | Site 1LE66924 (6692 Tollgate Rd - Zionsville) | 202678 | 15024918 | 58060044 | Lehigh | Lehigh | Upper Milford Twp, Lehigh Co | 55 | 81011603 | $16,433.00 | 4/18/2016 |
| Zito Canton, LLC | Site 1NH0854E (8185 Sullivan Trail) | 202692 | 15024953 | 58060091 | Lehigh | Bethlehem | Stockertown Boro, Northampton Co | 44 | 81011604 | $14,793.00 | 4/18/2016 |
| Zito Canton, LLC | Sites 1LE0943H, 1LE9541A & 1LE6707A (Conjoint | 202699 | 15025618 | 58063740 | Lehigh | Lehigh | Upper Milford Twp & Lower Milford Twp, Lehigh Co | 56 | 81011606 | $23,934.00 | 4/18/2016 |
| Zito Canton, LLC | Site 1LE8898A - 4801 Kernsville Rd (Orefield) | 202867 | 15031112 | 58076872 | Lehigh | Lehigh | North Whitehall Twp & South Whitehall Twp, Lehigh Co | 20 | 81011605 | $7,536.00 | 4/18/2016 |

Outstanding Total: **$351,049.48**

5/16/16 Status Category 2) Applications which will be placed on hold where data collection and engineering are complete, Construction has been schedule, but not started and Zito has Paid

6/16/16 Status Category 2) Applications which will be processed upon receipt of payment from Zito for Category 1) Applications. Data collection and engineering are complete, and Construction will be scheduled and executed. Zito has paid for these previously.

| Customer | Customer ID | Application | WAM WR | WAM WO | Region | AREA | Location | # of Poles Submitted | Total Design Costs | |
|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | Storey Hollow Rd (Site 257) - App 1 | 202173 | 15009439 | 58012461 | Northeast | Pocono | Tunkhannock Twp, Monroe Co | 66 | $14,641.84 | |
| Zito Canton, LLC | Site 1NH0897A - 2005 Chester Rd (Bethlehem) | 202864 | 15031111 | 58076674 | Lehigh | Bethlehem | Bethlehem Twp & Bethlehem City, Northampton Co | 37 | $7,166.90 | |
| Zito Canton, LLC | MSO 16 - App 2 | 203012 | 15034767 | 58086683 | Northeast | Pocono | Sterling Twp, Wayne Co | 16 | $3,800.25 | |
| | | | | | | | | | Total | $24,609.00 |

5/16/16 Status Category 3) Applications where Engineering was performed, invoice sent and paid, but Zito Cancelled construction before it started

6/16/16 Status Category 3) Applications where Engineering was performed, invoice sent and paid, but Zito Cancelled construction before it started. Refund amount will be applied to Category 1) Invoices

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice Amount | |
|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | 3000 Church Road (Site 218) | 202148 | 15009293 | 58008741 | Central | Wilkes-Barre | Rice Twp, Luzerne Co | 12 | $6,868.00 | |
| Zito Canton, LLC | 216 Friemann Road (Site 227) - App 1 | 202204 | 15010455 | 58015085 | Northeast | Pocono | Chestnuthill Twp, Monroe Co | 94 | $26,105.30 | |
| | | | | | | | | | Value PPL is Holding, Will be applied to t | $32,993.30 |

5/16/16 Status Category 4) Applications will be placed on hold, data collection complete engineering not started and therfore not yet invoiced

6/16/16 Status Category 4) Applications which will be processed upon receipt of payment from Zito for Category 1) Applications. Data Collection complete and Engineering will begin

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice# | Invoice Amount | Invoice Sent Date |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | Loyalsock Twp SD - App 1 | 203257 | 15040585 | 58110966 | Susquehanna | Susquehanna | Williamsport City, Lycoming Co | 100 | | $8,080.00 | |
| Zito Canton, LLC | Loyalsock Twp SD - App 3 | 203258 | 15040587 | 58110968 | Susquehanna | Susquehanna | Loyalsock Twp, Lycoming Co | 66 | | $5,360.00 | |
| Zito Canton, LLC | Loyalsock Twp SD - App 2 | 203262 | 15040590 | 58110974 | Susquehanna | Susquehanna | Williamsport City & Loyalsock Twp, Lycoming Co | 100 | | $8,080.00 | |
| Zito Canton, LLC | Site # 2NM8967A - Tannish Trail, Kunkeltown | 203268 | 15040838 | 58111581 | Northeast | Pocono | Eldred Twp, Monroe Co | 7 | | $640.00 | |
| | | | | | | | | | | Inflight Total | $22,160.00 |

5/16/16 Status Category 5) Applications which will be rejected

6/16/16 Status Category 5) Applications which should be re-submitted for processing upon receipt of payment from Zito for Category 1) Applications.

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice# | Invoice Amount | Invoice Sent Date |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | IU 17 - App 1 | 203297 | | | Susquehanna | Susquehanna | Williamsport City, Lycoming Co | 100 | | | |
| Zito Canton, LLC | IU 17 - App 2 | 203298 | | | Susquehanna | Susquehanna | Woodward Twp & Williamsport City, Lycoming Co | 96 | | | |
| Zito Canton, LLC | IU 17 (Montoursville) - App 4 | 203299 | | | Susquehanna | Susquehanna | Fairfield Twp & Montoursville Boro, Lycoming Co | 100 | | | |
| Zito Canton, LLC | IU 17 (Montoursville) - App 5 | 203300 | | | Susquehanna | Susquehanna | Fairfield Twp, Lycoming Co | 26 | | | |

6/16/16 New Category 6) Applications where Data Collection and Engineering is completed, Invoice has been sent, Awaiting direction from Zito. Different from Category 1) because the amount has not been disputed, but it also not yet paid.

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice# | Invoice Amount | Invoice Sent Date | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | 800 Lititz Pike - App 5 | 202130 | 15008427 | 58006790 | Lancaster | Lancaster East | Lititz Boro & Warwick Twp, Lancaster Co | 41 | 81009792 | $27,861.00 | 9/2/2015 | Awaiting direction from Zito |
| Zito Canton, LLC | MSO 16 - App 1 | 203011 | 15034766 | 58086688 | Northeast | Pocono | Sterling Twp & Dreher Twp, Wayne Co | 89 | 81011814 | $29,138.68 | 6/1/2016 | Awaiting direction from Zito |

6/16/16 New Category 7) Applications where Data Collection and Engineering is completed, Invoice has been sent, Zito has cancelled and a new invoice will be sent for only the Survey and Engineering Costs

| Customer | Customer ID | Application # | WAM WR# | WAM WO# | Region | AREA | Location | # of Poles Submitted | Invoice# | Invoice Amount | Invoice Sent Date | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zito Canton, LLC | Site 1LE0759E - Transitor Lane | 203050 | 15035563 | 58088743 | Lehigh | Lehigh | Washington Twp, Lehigh Co | 35 | 81011770 | $27,996.00 | 5/5/2016 | New value will be $7,042. |

6/16/16 New Category 8) Check 26491 Received from Zito 6/15/16. Will be applied to value of outstanding invoices in Category 1)

| Check Value |
|---|
| $90,000.00 |

Summary of Outstanding Invoices which must be paid by Zito to PPL in order for PPL to begin processing all other applications

| | |
|---|---|
| Category 1) Value of Outstanding Invoices | $351,049.48 |
| Category 3) Refund for Cancelled Applications to be applied to Balance in Category 1) | ($32,993.30) |
| Category 8) Check 26491 to be applied to Balance in Category 1) | ($90,000.00) |
| Outstanding Balance to be paid by Zito to PPL in order for PPL to begin processing all other applications | $228,056.18 |

# EXHIBIT 5

# DISPUTED INVOICE CHARGES BY PPL AND PAYMENTS BY ZITO

| Project | # Poles | MR poles | App # | App Date | Original Invoice Date Received | MR Construction Total | Engineering Total | Invoice Total | Pd Date |
|---|---|---|---|---|---|---|---|---|---|
| Site 181 - Glen Rock Rd | 34 | 4 | 202131 | 3/20/2015 | 4/24/2015 | $2,080.00 | $3,140.48 | $5,220.48 | 5/5/2015 |
| Site 275 - 13020 State Route 405 | 93 | 38 | 202132 | 3/20/2015 | 7/8/2015 | $38,146.84 | $7,887.10 | $46,033.94 | 5/5/2015 |
| Site 275 - 13020 State Route 405 | 87 | 3 | 202133 | 3/20/2015 | 4/24/2015 | $2,134.00 | $7,378.66 | $9,512.66 | 12/10/2015 |
| Site 264 - 1643 Rovendale Dr | 15 | 2 | 202134 | 3/20/2015 | 7/16/2015 | $2,318.00 | $2,226.88 | $4,544.88 | 8/5/2015 |
| Site 181 - Glen Rock Rd | 90 | 16 | 202135 | 3/20/2015 | 4/22/2015 | $8,265.00 | $7,492.02 | $15,757.02 | 5/5/2015 |
| Site 275 - 13020 State Route 405 (Eng) | 2 | 1 | 202136 | 3/23/2015 | 11/24/2015 | $6,403.18 | $0.00 | $6,403.18 | 7/30/2015 |
| Site 275 - 13020 State Route 405 (Eng) | 1 | 0 | 202136 | 3/23/2015 | 7/22/2015 | $0.00 | $58.36 | $58.36 | 10/29/2015 |
| Site 267 - RR2 Small Mtn Rd | 25 | 1 | 202144 | 3/24/2015 | 8/5/2015 | $1,131.00 | $3,146.14 | $4,277.14 | 8/17/2015 |
| Site 67 - 525 St. Johns Rd (Eng) | 4 | 0 | 202145 | 3/24/2015 | 6/25/2015 | $0.00 | $611.72 | $611.72 | 7/8/2015 |
| Site 41 - Old Turnpike Rd | 3 | 3 | 202146 | 3/24/2015 | 5/1/2015 | $1,711.00 | $307.54 | $2,018.54 | 5/11/2015 |
| Site 9 - Zion Hill Rd | 32 | 17 | 202147 | 3/24/2015 | 9/25/2015 | $32,976.00 | $7,017.00 | $39,993.00 | 10/19/2015 |
| Site 251 - Route 93 (Eng) | 3 | 0 | 202143 | 4/2/2015 | 9/10/2015 | $0.00 | $252.54 | $252.54 | 9/17/2015 |
| Site 35 - 460 Farmington Rd | 5 | 3 | 202171 | 4/2/2015 | 7/21/2015 | $2,779.00 | $1,446.00 | $4,225.00 | 7/20/2015 |
| Site 81 - 5141 Jasper Rd | 2 | 1 | 202172 | 4/2/2015 | 7/21/2015 | $1,242.00 | $1,527.00 | $2,769.00 | 8/5/2015 |
| Site 257 - Stony Hollow Rd (26) | 96 | 1 | 202173 | 4/2/2015 | 9/11/2015 | $1,122.00 | $14,641.84 | $15,763.84 | 4/21/2016 |
| Site 257 - Stoney Hollow Rd | 24 | 1 | 202174 | 4/2/2015 | 6/2/2015 | $397.00 | $1,404.18 | $1,801.18 | 6/23/2015 |
| Site 262 - Heller's Rd & Tunkhannock Dr | 91 | 3 | 202177 | 4/2/2015 | 7/10/2015 | $19,186.00 | $7,919.64 | $27,105.64 | 6/15/2015 |
| Site 262 - Heller's Rd & Tunkhannock Dr | 27 | 10 | 202180 | 4/2/2015 | 5/28/2015 | $5,568.00 | $2,327.86 | $7,895.86 | 7/2/2015 |
| PTD (Weist Mkt - Bald Eagle Street, Lock Haven) | 32 | 10 | 202191 | 4/9/2015 | 7/30/2015 | $6,600.00 | $4,829.74 | $11,429.74 | 8/6/2015 |
| PTD (Weis Mkt - 1916 Lycoming Creek) | 20 | 1 | 202192 | 4/9/2015 | 8/4/2015 | $867.00 | $2,896.96 | $3,763.96 | 8/6/2015 |
| PTD (Weis Mkt - 6 Milbrook Plaza Mill Hall) | 14 | 2 | 202194 | 4/9/2015 | 7/30/2015 | $2,037.00 | $2,146.06 | $4,183.06 | 8/3/2015 |
| Site 41 - Old Turnpike Rd (Eng) | 1 | 0 | 202213 | 4/14/2015 | 8/31/2015 | $0.00 | $139.18 | $139.18 | 9/9/2015 |
| Site 37 - Hilltop Dr @ Southview Dr | 87 | 32 | 202214 | 4/15/2015 | 9/18/2015 | $84,250.00 | $18,196.00 | $102,446.00 | 10/22/2015 |
| Site 37 - Hilltop Dr @ Southview Dr | 99 | 16 | 202231 | 4/21/2015 | 9/18/2015 | $47,383.00 | $16,395.00 | $63,778.00 | 10/22/2015 |
| Sites 179 & 180 - W High St & Schoeneck Ave | 12 | 3 | 202232 | 4/21/2015 | 10/8/2015 | $2,506.00 | $3,954.00 | $6,460.00 | 10/8/2015 |
| Sites 307 & 308 - Old York Rd & Locust Rd | 24 | 23 | 202246 | 4/27/2015 | 9/18/2015 | $68,168.00 | $7,866.00 | $76,034.00 | 10/29/2015 |
| Sites 307 & 308 - Old York Rd & Locust Rd | 98 | 33 | 202247 | 4/27/2015 | 9/25/2015 | $97,756.00 | $20,249.00 | $118,005.00 | 10/29/2015 |
| Sites 307 & 308 - Old York Rd & Locust Rd | 93 | 46 | 202248 | 4/27/2015 | 9/25/2015 | $63,861.00 | $18,870.00 | $82,731.00 | 10/29/2015 |
| Site 181 - Glen Rock Rd (Reroute) | 17 | 5 | 202320 | 5/20/2015 | 9/25/2015 | $7,735.00 | $3,212.00 | $10,947.00 | 10/5/2015 |
| Site 181 - Glen Rock Rd | 6 | 1 | 202528 | 8/6/2015 | 9/2/2015 | $1,081.00 | $919.26 | $2,000.26 | 9/9/2015 |
| Site 2CE2035A - Rt 435, Gouldsboro | 4 | 2 | 202676 | 10/5/2015 | 10/30/2015 | $3,043.00 | $959.26 | $4,002.26 | 3/7/2016 |
| Site 1LE6101C - 5430 Chestnut St | 1 | 1 | 202677 | 10/5/2015 | 11/12/2015 | $1,326.00 | $720.00 | $2,046.00 | 2/18/2016 |
| Sites 1LE0933H 1LE5961A 1LE6707A - 3063 Yost Lane, Vera Cruz & PA Turnpike & 2671 Cassel Rd (Coopersburg) (2) | 91 | 0 | 202705 | 10/16/2015 | 1/19/2016 | $0.00 | $19,377.00 | $19,377.00 | 4/29/2016 |
| Site 37 - Hilltop Dr @ Southview Dr | 1 | 1 | 202707 | 10/21/2015 | 11/30/2015 | $1,229.00 | $669.00 | $1,898.00 | 12/8/2015 |
| Site 2LU6362C - 36 Terrace Rd (Eng) (4) | 90 | 0 | 202715 | 10/26/2015 | 4/30/2016 | $0.00 | $15,046.10 | $15,046.10 | 5/4/2016 |
| Site 2LU6362C - 36 Terrace Rd (Eng) | 11 | 0 | 202716 | 10/26/2015 | 2/10/2016 | $0.00 | $1,909.19 | $1,909.19 | 2/8/2016 |
| Herr System to Canton - App 1 | 26 | 1 | 202846 | 12/10/2015 | 2/16/2016 | $2,326.00 | $4,630.40 | $6,956.40 | 2/25/2016 |
| Herr System to Canton - App 2 | 10 | 2 | 202847 | 12/10/2015 | 2/16/2016 | $1,439.00 | $1,829.19 | $3,268.19 | 2/25/2016 |
| Site 1NH8897A - 2005 Chester Rd, Bethlehem (32) | 36 | 12 | 202864 | 12/17/2015 | 2/17/2016 | $15,378.00 | $7,166.00 | $22,544.00 | 3/7/2016 |
| Site 37 - Hilltop Dr @ Southview Dr | 2 | 1 | 202870 | 12/18/2015 | 2/17/2016 | $1,389.00 | $1,237.00 | $2,626.00 | 3/1/2016 |
| 2EB2081A PO Box 239 - I-81 Exit 65 (MSO 16 app 1) | 89 | 25 | 203011 | 2/3/2016 | 6/22/2016 | $14,003.00 | $15,138.68 | $29,141.68 | 6/23/2016 |
| 2EB2082D US 11 RD # 2 New Milford Sand & Gravel (MSO 16 - app 2) (15) | 16 | 5 | 203012 | 2/3/2016 | 3/22/2016 | $8,119.00 | $2,800.25 | $10,919.25 | 3/31/2016 |
| 2MN8667A 190 Tanzosh Trail (Kunkletown) | 7 | 2 | 203268 | 4/29/2016 | 7/11/2016 | $1,933.00 | | $1,933.00 | 7/29/2016 |
| Loyalsock Twp SD - App 1 | 100 | 6 | 203257 | 6/20/2016 | 8/14/2016 | $10,244.00 | $17,227.73 | $27,471.73 | 8/18/2016 |
| Loyalsock Twp SD - App 3 | 66 | 16 | 203258 | 6/20/2016 | 8/29/2016 | $16,857.00 | $12,778.84 | $29,635.84 | 8/31/2016 |
| Loyalsock Twp SD - App 2 | 100 | 25 | 203262 | 6/20/2016 | 8/14/2016 | $39,026.00 | $18,355.79 | $57,381.79 | 8/18/2016 |
| IU 17- App 1 | 100 | 17 | 203297 | 6/20/2016 | 8/28/2016 | $12,229.00 | $16,917.59 | $29,146.59 | 8/31/2016 |
| IU 17 - App 2 | 96 | 10 | 203298 | 6/20/2016 | 8/28/2016 | $13,356.00 | $16,696.01 | $30,052.01 | 8/31/2016 |
| IU 17 (Montoursville) - App 4 | 100 | 29 | 203299 | 6/20/2016 | 8/22/2016 | $28,616.00 | $15,681.68 | $44,297.68 | 9/1/2016 |
| IU 17 (Montoursville) - App 5 | 26 | 19 | 203300 | 6/20/2016 | 9/7/2016 | $9,670.00 | $5,520.12 | $15,190.12 | 9/9/2016 |
| IU 17 (Montoursville) - App 3 | 98 | 14 | 203381 | 6/20/2016 | 8/28/2016 | $11,497.00 | $16,238.40 | $27,735.40 | 8/31/2016 |
| IU17 (Loyalsock to Montgomery) - App 1 | 100 | 20 | 203382 | 6/20/2016 | 9/6/2016 | $22,854.00 | $18,993.83 | $41,847.83 | 9/9/2016 |
| IU17 (Loyalsock to Montgomery) - App 2 | 86 | 29 | 203383 | 6/20/2016 | 8/28/2016 | $17,986.00 | $16,048.85 | $34,034.85 | 8/31/2016 |
| IU17 (Jersey Shore) - App 1 | 100 | 11 | 203384 | 6/20/2016 | 8/20/2016 | $6,239.00 | $17,327.40 | $23,566.40 | 8/23/2016 |
| IU17 (Jersey Shore) - App 2 | 100 | 7 | 203385 | 6/20/2016 | 8/28/2016 | $9,741.00 | $16,543.16 | $26,284.16 | 8/31/2016 |
| IU17 (Jersey Shore) - App 3 | 13 | 0 | 203386 | 6/20/2016 | 8/16/2016 | $0.00 | $2,295.30 | $2,295.30 | 8/23/2016 |
| IU17 (Muncy) - App 6 | 100 | 13 | 203388 | 6/20/2016 | 9/14/2016 | $23,505.00 | $16,785.32 | $40,290.32 | 9/22/2016 |
| IU17 (Muncy) - App 7 | 99 | 12 | 203389 | 6/20/2016 | 8/11/2016 | $11,370.00 | $17,779.83 | $29,149.83 | 8/16/2016 |
| IU17 (Muncy) - App 8 | 9 | 1 | 203390 | 6/20/2016 | 7/27/2016 | $1,558.00 | $1,717.23 | $3,275.23 | 8/2/2016 |
| 2MO8923A 2852 Pleasant Ridge Rd, Cresco | 34 | 6 | 203475 | 7/7/2016 | 8/11/2016 | $5,561.00 | $5,620.34 | $11,181.34 | 8/16/2016 |
| Loyalsock Twp SD - App 3.5 | 2 | 0 | 203607 | 8/24/2016 | 9/23/2016 | $0.00 | $190.00 | $190.00 | 9/26/2016 |
| Lezzer Lumber (Pennsdale) | 18 | 2 | 203626 | 8/29/2016 | 11/2/2016 | $1,754.00 | $3,338.10 | $5,092.10 | 11/8/2016 |
| Lezzer Lumber (Williamsport) | 2 | 0 | 203628 | 8/30/2016 | 10/5/2016 | $0.00 | $498.87 | $498.87 | 11/11/2016 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Loyalsock Twp SD (Memorial & Day)** | **15** | **0** | 203631 | 8/31/2016 | 10/5/2016 | $0.00 | $2,654.35 | $2,654.35 | 10/11/2016 |
| **IU17 (Loyalsock to Montgomery - App 1.5)** | **5** | **0** | 203634 | 9/1/2016 | 10/5/2016 | $0.00 | $718.69 | $718.69 | 10/11/2016 |
| **IU17 (Montoursville) - App 4.5** | **1** | **0** | 203694 | 9/28/2016 | 11/8/2016 | $0.00 | $171.20 | $171.20 | 11/17/2016 |
| **Lezzer Lumber (Pennsdale) - Reroute** | **1** | **0** | 203765 | 10/18/2016 | 12/6/2016 | $0.00 | $251.20 | $251.20 | 12/9/2016 |
| **IU17 (Montoursville) - App 5.5** | **3** | **3** | 203856 | 12/21/2016 | 1/10/2017 | $13,045.45 | $0.00 | $13,045.45 | 1/13/2017 |
| **Site 2LA8946A - 1761 Newport Rd, Ephrata** | **4** | **3** | 203930 | 2/6/2017 | 2/28/2017 | $2,096.00 | $928.00 | $3,024.00 | 3/1/2017 |
| **Site 1LE8917A - 7471 Keebler Way, Allentown** | **22** | **9** | 204081 | 3/2/2017 | 4/30/2017 | $18,743.00 | $6,388.20 | $25,131.20 | 5/9/2017 |
| **Site 2CL8957B - 1236 R Claremont Rd, Carlisle** | **59** | **21** | 204082 | 3/2/2017 | 4/27/2017 | $26,471.00 | $15,449.00 | $41,920.00 | 6/27/2017 |
| **Keystone Central SD** | **56** | **9** | 204084 | 3/3/2017 | 4/26/2017 | $7,809.00 | $13,320.66 | $21,129.66 | 5/1/2017 |
| **Evangelical Community Hospital** | **7** | **1** | 204118 | 3/14/2017 | 4/19/2017 | $1,187.00 | $1,419.47 | $2,606.47 | 4/21/2017 |
| **Site 2LK9522D - 1230 Hampton St, Scranton** | **30** | **8** | 204172 | 4/3/2017 | 6/18/2017 | $9,720.00 | $7,730.13 | $17,450.13 | 7/18/2017 |
| **Clinton Co. PSAP (112-74) (8)** | **34** | **5** | 204336 | 6/1/2017 | 7/26/2017 | $9,857.00 | $5,112.00 | $14,969.00 | 9/11/2017 |
| **Clinton Co PSAP (111-76 - 108-79)** | **101** | **28** | 204337 | 6/1/2017 | 8/8/2017 | $56,651.00 | $24,882.66 | $81,533.66 | 8/16/2017 |
| **Lycoming Co PSAP (95-99 - 98-98) (19)** | **90** | **3** | 204360 | 6/8/2017 | 8/8/2017 | $4,850.00 | $24,436.78 | $29,286.78 | 8/16/2017 |
| **Lycoming Co PSAP (98-98 - 100-98)** | **46** | **8** | 204361 | 6/8/2017 | 8/30/2017 | $21,660.00 | $11,049.02 | $32,709.02 | 9/8/2017 |
| **Clinton Co PSAP (107-79 -106-81)** | **100** | **32** | 204363 | 6/9/2017 | 8/31/2017 | $89,012.00 | $26,893.38 | $115,905.38 | 10/9/2017 |
| **Clinton Co PSAP (106-82 - 105-83)** | **85** | **28** | 204400 | 6/23/2017 | 9/11/2017 | $52,662.00 | $26,647.72 | $79,309.72 | 9/14/2017 |
| **Clinton Co PSPA (105-83 - 104-84)** | **44** | **15** | 204401 | 6/23/2017 | 8/31/2017 | $36,514.00 | $11,800.20 | $48,314.20 | 9/8/2017 |
| **Clinton Co PSAP (112-74) Reroute** | **53** | **16** | 204408 | 6/26/2017 | 9/11/2017 | $26,845.00 | $13,910.32 | $40,755.32 | 9/14/2017 |
| **IU17 Milton - Baugher Elementary** | **52** | **27** | 204410 | 6/27/2017 | 9/11/2017 | $60,738.00 | $14,687.06 | $75,425.06 | 10/9/2017 |
| **IU17 Milton - White Deer Elementary** | **28** | **11** | 204413 | 6/27/2017 | 9/11/2017 | $19,565.00 | $7,660.90 | $27,225.90 | 9/14/2017 |
| **IU17 Milton - Milton Area SD (App 1)** | **98** | **26** | 204414 | 6/27/2017 | 9/20/2017 | $43,615.00 | $26,980.00 | $70,595.00 | 9/29/2017 |
| **IU17 Milton - Milton Area SD (App 2)** | **101** | **18** | 204416 | 6/27/2017 | 9/11/2017 | $59,821.00 | $23,817.66 | $83,638.66 | 10/9/2017 |
| **IU17 Milton - Milton Area SD (App 3)** | **47** | **15** | 204417 | 6/27/2017 | 9/11/2017 | $21,430.00 | $13,076.78 | $34,506.78 | 9/14/2017 |
| **IU17 Milton - Montandon Elementary** | **9** | | 204418 | 6/27/2017 | | | $2,565.00 | $2,565.00 | |
| **Columbia County PSAP** | **25** | **8** | 204433 | 7/6/2017 | 9/20/2017 | $65,321.00 | $7,555.82 | $72,876.82 | |
| **Clinton Co PSAP (112-75 - 111-76)** | **85** | | 204580 | 9/12/2017 | | | $24,225.00 | $24,225.00 | |

# DISPUTED INVOICE CHARGES BY PPL AND PAYMENTS BY ZITO - CANCELLED APPLICATIONS

| Project | # Poles | App # | App Date | Original Invoice Date Received | Engineering Total | Total Amt Paid | Pd Date |
|---|---|---|---|---|---|---|---|
| **Site 262 - Heller's Rd** | **89** | 202176 | 4/2/2015 | 9/9/2015 | $12,905.54 | $12,905.54 | 6/17/2016 |
| **Site 262 - Heller's Rd** | **99** | 202178 | 4/2/2015 | 9/1/2015 | $14,741.76 | $14,741.76 | 6/17/2016 |
| **Site 262 - Heller's Rd** | **96** | 202179 | 4/2/2015 | | $17,121.84 | $17,121.84 | 6/17/2016 |
| **Site 112 - Leithsville Rd** | **99** | 202333 | 4/28/2015 | 10/19/2015 | $19,236.00 | $19,236.00 | 6/17/2016 |
| **Site 112 - Leithsville Rd** | **59** | 202334 | 4/28/2015 | 9/25/2015 | $14,024.00 | $14,024.00 | 6/17/2016 |
| **Site 310 - Roble Rd** | **93** | 202169 | 4/2/2015 | 9/25/2015 | $19,502.00 | $19,502.00 | 6/17/2016 |
| **Site 310 - Roble Rd** | **43** | 202170 | 4/2/2015 | 10/5/2015 | $11,174.00 | $11,174.00 | 6/17/2016 |
| **Site 2 - 10th St** | **100** | 202229 | 4/21/2015 | 9/25/2015 | $19,160.00 | $19,160.00 | 6/17/2016 |
| **Site 83 - E Main St** | **58** | 202230 | 4/21/2015 | 9/15/2015 | $7,093.00 | $7,093.00 | 6/17/2016 |
| **Site 227 - Friemann Rd** | **20** | 202203 | 4/13/2015 | 9/30/2015 | $3,483.68 | $3,483.68 | 6/17/2016 |
| **Site 237 - Fairview Ave** | **97** | 202251 | 4/27/2015 | 10/14/2015 | $22,317.00 | $22,317.00 | 6/17/2016 |
| **Site 237 - Fairview Ave** | **94** | 202252 | 4/27/2015 | 10/6/2015 | $15,194.00 | $15,194.00 | 6/17/2016 |
| **Site 237 - Fairview Ave** | **100** | 202255 | 4/27/2015 | 10/6/2015 | $20,376.00 | $20,376.00 | 6/17/2016 |
| **Site 241 - Belmont Pike & Arnold St** | **99** | 202199 | 4/13/2015 | | $14,648.40 | $14,648.40 | 6/17/2016 |
| **Site 241 - Belmont Pike & Arnold St** | **34** | 202200 | 4/13/2015 | | $6,443.26 | $6,443.26 | 6/17/2016 |
| **Site 305 - Lititz Pike** | **79** | 202126 | 3/20/2015 | | $15,722.00 | $15,722.00 | 6/17/2016 |
| **Site 305 - Lititz Pike** | **93** | 202127 | 3/20/2015 | | $18,305.00 | $18,305.00 | 6/17/2016 |
| **Site 305 - Lititz Pike** | **94** | 202128 | 3/20/2015 | | $16,509.00 | $16,509.00 | 6/17/2016 |
| **Site 305 - Lititz Pike** | **100** | 202129 | 3/20/2015 | | $20,207.00 | $20,207.00 | 6/17/2016 |
| **Site 305 - Lititz Pike** | **41** | 202130 | 3/20/2015 | 8/31/2015 | $7,957.07 | $7,957.07 | 1/11/2017 |
| **Sites 1LE0933H 1LE5961A 1LE6707A - 3063 Yost Lane, Vera Cruz & PA Turnpike & 2671 Cassel Rd (Coopersburg)** | **91** | 202699 | 10/16/2015 | 1/19/2016 | $23,934.00 | $23,934.00 | 6/17/2016 |
| **Site 1LE6692A - 6692 Tollgate Rd (MSO 14)** | **53** | 202678 | 10/5/2015 | 12/14/2015 | $16,633.00 | $16,633.00 | 6/17/2016 |
| **Site 1NH5954E - 6185 Sullivan Trail (Plainfield)** | **44** | 202692 | 10/9/2015 | 12/14/2015 | $14,793.00 | $14,793.00 | 6/17/2016 |
| **Site 1NH8898A - 4801 Kersville Rd (Orefield)** | **20** | 202862 | 12/17/2015 | 2/17/2016 | $7,526.00 | $7,526.00 | 6/17/2016 |
| **Site 1LE0959E Translator Lane (Palmerton)** | **35** | 203050 | 2/17/2016 | 6/22/2016 | $7,942.00 | $7,942.00 | 8/2/2016 |
| **Site 218 - 3000 Church Rd** | **3** | 202148 | 3/24/2015 | 8/26/2015 | $1,598.60 | $1,598.60 | 9/3/2015 |
| **Site 227 - 216 Friemann Rd** | **94** | 202204 | 4/13/2015 | 8/31/2015 | $13,695.70 | $13,695.70 | 9/17/2015 |

# ATTACHMENT E

**Paul E. Russell**
Associate General Counsel

**PPL**
Two North Ninth Street
Allentown, PA 18101-1179
Tel. 610.774.4254 Fax 610.774.6726
perussell@pplweb.com

**FEDERAL EXPRESS**

October 1, 2014



Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, Pennsylvania 17105-3265

**Re: PPL Electric Utilities Corporation**
**Biennial Inspection, Maintenance, Repair and Replacement Plan**
**For the Period January 1, 2016 – December 31, 2017**
**Docket No. M-2009-2094773**

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") an original of PPL Electric's Biennial Inspection, Maintenance, Repair and Replacement Plan for the Period January 1, 2016 – December 31, 2017 ("I&M Plan"). PPL Electric's I&M Plan is being filed pursuant to the Commission's regulations at 52 Pa. Code §§ 57.191, et seq.

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on October 1, 2014, which is the date it was deposited with an overnight express delivery service as shown on the delivery receipt attached to the mailing envelope.

*In addition, please date and time-stamp the enclosed extra copy of this* letter and return it to me in the envelope provided.

If you have any questions, please call me or Stephen J. Gelatko, PPL Electric's Manager –Distribution Asset Management at (610) 774-4785.

Very truly yours,

Paul E. Russell

Enclosures

cc: Mr. Paul Diskin
Tanya J. McCloskey, Esquire
Mr. John R. Evans
Mr. David Washko

# Biennial Inspection, Maintenance, Repair and Replacement Plan of PPL Electric Utilities Corporation

## For the Period of January 1, 2016 – December 31, 2017



Submitted by:

Stephen J. Gelatko
Sr. Manager - Distribution Asset Planning
Two North Ninth Street
Allentown, PA 18101
(610) 774-4402
sgelatko@pplweb.com

Dated: October 1, 2014

Table of Contents

# PPL Electric Utilities Corporation

***Introduction***

PPL Electric Utilities Corporation ("PPL Electric" or "Company") is firmly committed to maintaining high levels of customer satisfaction. Customer surveys repeatedly have demonstrated that successful achievement of high levels of customer satisfaction depends upon providing acceptable levels of reliability performance coupled with a reasonable cost of providing service.

PPL Electric has established a strong, long-term record of customer satisfaction and electric reliability. PPL Electric has earned 22 J. D. Power customer satisfaction awards – more than any other investor-owned utility in the country – since J. D. Power customer satisfaction began studying customer satisfaction among electric utility customers. PPL Electric has ranked highest among large electric utilities in the eastern United States in J. D. Power annual study of residential customer satisfaction 11 times: in 1999 and from 2001-2007 and 2012-2014. In 2014, PPL Electric was recognized twice for ranking highest among large electric utilities in the eastern United States by J. D. Power for customer satisfaction. PPL Electric was awarded one for business customer satisfaction in February and one for residential customer satisfaction in July.

Ultimately, all of the costs of maintaining reliability are borne by the ratepayers. Therefore, managing finite resources to produce optimal results is essential in order to deliver excellence in customer satisfaction. The criteria for program inclusion is not whether any given activity produces a positive reliability result, but, rather, what portfolio of activities produces the best result for a given expenditure of resources given the specific reliability challenges faced by PPL Electric at this point in time, and for the foreseeable future. PPL Electric's goal is focused on results (i.e., the reliability experienced by customers), not the rote execution of particular tasks.

Reliability performance is driven by a mixture of manageable and unmanageable factors. The most impactful of the unmanageable factors is the frequency and severity of weather events, which can vary dramatically over time and geography. The manageable factors have an effect on service interruption frequency, duration, or number of customers affected, or a combination of all three. Figure 1 depicts a portfolio of manageable factors with inspection and maintenance ("I&M") practices being one of many.

## PPL Electric Utilities Corporation

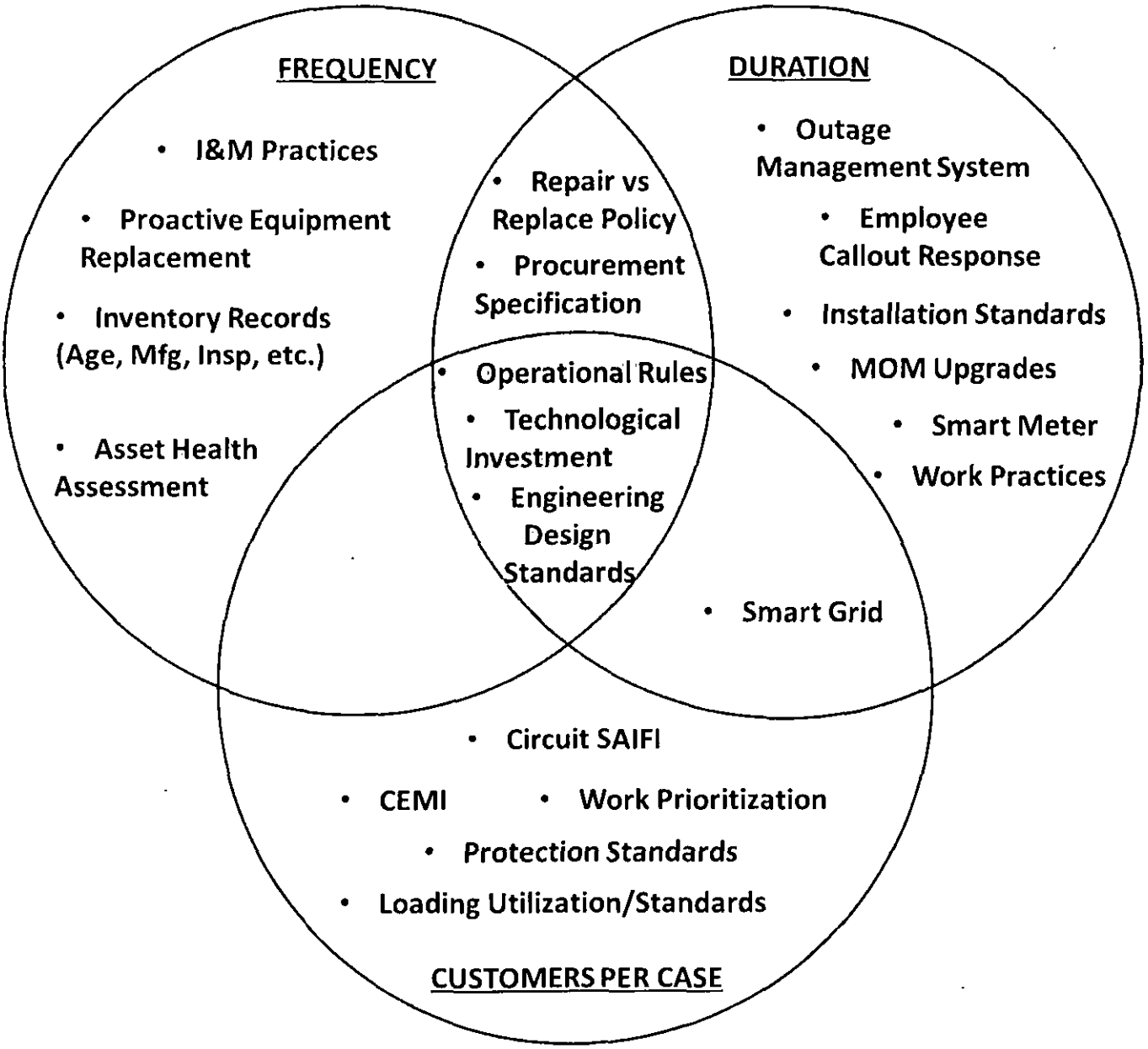



**Figure 1: Reliability Programs and Policies**

PPL Electric's philosophy is that the first step in improving reliability is to prevent outages altogether. The primary focus is, therefore, on the manageable factors that reduce the frequency (number) of cases. Efforts that typically overlap are those designed to minimize the number of customers affected should an outage occur. Realizing that not all outages are preventable, PPL Electric also directs rigorous efforts designed to reduce the duration of the outages that do occur. Examples of PPL Electric initiatives addressing each of the three reliability sectors, frequency (number of cases), customers affected per case, and duration are addressed below.

**Frequency (number of cases)**

- **Asset Optimization Strategy ("AOS"):** PPL Electric conducted a major condition assessment and maintenance study of its distribution system involving individuals from the Distribution, Protection and Control, Substation, and Reliability groups. This project was initiated to identify and address the challenges created by the Company's aging infrastructure. The objectives were to assess equipment health in seventeen distribution asset classes comprising approximately 30,000,000 units of equipment, and generate a strategy for capital replacements and maintenance improvements to address these challenges. PPL Electric conducts effectiveness reviews of the various programs comprising this strategy to ensure that aging infrastructure continues to be appropriately addressed.

- **Asset Health Assessment:** In 2013, PPL Electric partnered with Kinectrics, a global leader in asset management, to calculate health and criticality scores for circuit breakers, power transformers, and substation battery banks. The health scores were based on operational data, test and inspection data, corrective maintenance history, and documented manufacturer issues. The criticality scores were based on customer and system impact if a failure were to occur. Once the scores were calculated, the AOS replacement programs for these asset classes were further refined to achieve the most reliability impact. The Company is now setting up a program to calculate health and criticality values using the calculations provided by Kinectrics coupled with new inspection and operational data. In the future, the Company will be calculating health scores for other asset classes.

- **Long Term Infrastructure Improvement Plan:** In 2012 PPL Electric developed and filed a Long Term Infrastructure Improvement Plan that was approved by the Pennsylvania PUC in January 2013. The Plan is a continuation of AOS infrastructure replacements in addition to prudent capital investments such as the proactive installation of animal guards, new sectionalizing devices, distribution automation, asset life extension methods, replacement of deteriorated equipment, and capital projects aimed at addressing worst performing circuits ("WPCs"). The investment is expected to mitigate the growth in equipment failure projections in the short-term and reverse the trend in the long-term. Equipment failure trends, in addition to asset specific contribution to system level metrics, are analyzed on an ongoing basis to ensure funding is invested appropriately. This Plan was submitted pursuant to the requirements of Subchapter B, Distribution Systems, of the Public Utility Code, 66 Pa.C.S. §§ 1350-1360, and the Public Utility Commission's ("PUC") Implementation Order for Establishment of a Distribution System Improvement Charge ("DSIC"). PPL Electric's most recent updates are included in the March 2014 filing of its Annual Asset Optimization Plan.

- **Customers Experiencing Multiple Interruptions ("CEMI") Program:** The goals of the CEMI Program are to reduce the number of interruptions experienced by customers so that no customer has more than ten interruptions per year, and to communicate in an effective and timely manner with these customers when service interruptions occur. CEMI performance is monitored closely by regional distribution planners and reliability supervisors to identify cost-effective solutions that are submitted to the CEMI Task Force. The performance improvement has been noteworthy. From

2008-2011 customers experiencing ten or more outages ("CEMI >10) was above 150 for each year. In 2012 CEMI >10 was below 100 and in 2013 it decreased further to less than 20. The Task Force maintains a prioritized list of approved submitted projects based upon prior year CEMI results and authorizes projects based upon available funding to continue the Company's commitment to this successful program.

The CEMI program is structured around three key attributes:

- Anticipate – analyze, predict, and attempt to prevent multiple service interruptions from occurring.
- Mitigate – when multiple service interruptions occur, determine root causes, develop solutions, and ultimately implement corrective actions to help in reducing the risk of future service interruptions.
- Communicate – following multiple service interruptions, contact customers to inform them that PPL Electric is aware that a service interruption has occurred, provide the cause of the service interruption, and its plans to prevent future service interruptions, among other pertinent details. In addition, when solutions are implemented, contact customers and advise them of the improvements made.

- **Distribution and substation animal guarding:** Two new programs were established in 2009 to install animal guards on distribution overhead transformers and switches in locations with a high density of animal-related service outages since 2002, and to install animal guard materials at all distribution substations by 2017. This program has proven effective. The past three years (2011-2013) have each had a 20% or greater decrease in animal related outages than the previous ten year low. Additionally, the average animal related CMI for the same years is more than 30% lower than the previous ten year average.

- **Inspection and maintenance practices and programs:** PPL Electric remains focused on equipment performance and service interruption avoidance through the application of effective inspection and maintenance practice and programs. A comprehensive discussion has been provided to the PUC via PPL Electric's I&M filing on a biennial basis since the initial filing in 2010. The scope of these programs, procedures and activities covers all areas of the electrical infrastructure to include transmission, substations, distribution, and vegetation.

  **Transmission**
  Transmission inspection programs include aerial patrols and structure inspections, treatments and replacements. The patrols focus on comprehensive inspections, routine inspections and identification of emergency work. The inspections encompass all equipment, including poles, arms, line switches, interrupters, arresters, grounding, guying, anchors and other key transmission components.

***Substation***
Substation maintenance programs include inspections, condition testing and preventative maintenance of equipment, such as power transformers, circuit breakers, disconnects, power cables, and security equipment. Some equipment is maintained on a time basis; other equipment is condition monitored. These two methods help ensure that maintenance work is performed in a timely manner. In addition to time and condition-based maintenance, thermo-graphic inspections help to ensure that substation equipment does not operate at elevated temperature levels, which could lead to premature failures.

**Distribution**
Distribution encompasses many maintenance aspects similar to transmission and substations, and also includes load surveys that help engineers determine peak load requirements, and circuit analyses that help engineers identify lines requiring maintenance work, voltage relief, or other capital improvements. Overhead line inspections identify the weak links in the system so that damaged or deteriorated equipment can be repaired or replaced. In addition, distribution maintenance includes inspections of poles, voltage regulators, line switches, capacitors, and other key distribution equipment. PPL Electric also tests underground cable for integrity to determine if the cable needs to be replaced, repaired or cured to prevent future failures.

**Vegetation**
The vegetation on PPL Electric's transmission and distribution rights-of-way is maintained utilizing a combination of several management techniques. These include reclearing, ground-to-sky trimming, hazard tree removal, tree pruning, and herbicide application. The work is prioritized based on the conditions observed and past performance.

Each of these programs is more fully described in Appendices A through D.

**Customers affected per case**

- **Expanded Operational Reviews ("EOR"):** EORs are performed on each circuit on a four-year cycle. The review addresses both operational and reliability characteristics of each circuit. Voltage support, phase balancing, power factor maintenance and loading issues are addressed from an operational perspective. Service outage analysis, exposure analysis and field checks address reliability and power quality.

- **Reliability Principles and Practices ("P&P") Revisions:** The P&P sets forth a set of principles that PPL Electric follows to plan, protect and operate the Electrical Distribution System ("EDS"). These Principles are implemented through a set of standard practices that are used as guidelines in designing the EDS. These practices are reviewed regularly to ensure they remain reasonable, acceptable and align well in accordance with good utility practices. Additional revisions

to PPL Electric's Reliability Principles and Practices (P&P) are underway to reduce the overall impact to our customers by implementing smart grid strategies.

- **Circuit SAIFI:** In 2013, PPL Electric launched a system wide initiative to install almost 1,000 new fuses in order to ensure that single phase taps are fused to limit the number of customers exposed to an outage on a given circuit. The Company continues to evaluate areas where fuse installation may reduce customer exposure to outages.

**Duration (minutes/case)**

- **Mobile Operations Management ("MOM"):** As of September 2014 a major upgrade of equipment and software is underway to further enhance capabilities. The MOM project originated as three-year project ending in October 2009 which equipped most Distribution Operations vehicles with laptop computers and software. This project provides crews with their work for the day, as well as access to maps, directions, transmission and distribution system information, and more. The real-time view of field work, assisted by built-in GPS capability, means more timely and accurate dispatching and job tracking. In addition, as work is completed, the priorities of remaining work are readjusted to ensure that the next job also is the most critical.

- **Automated Callout:** In the 3rd quarter of 2013, Distribution Operations implemented a new automated system to call employees into work for after-hours emergencies. This new system performs callouts simultaneously, whereas the previous system performed callouts sequentially, which shortens response time under storm conditions when large numbers of employees must be called out to restore service to customers.

- **Outage Management System ("OMS") enhancements:** During 2014, PPL Electric upgraded its OMS system from PowerOn version 4.0 to version 4.2.3. Numerous improvements have been made to the software since version 4.0, including a stronger model of the network grid, improved system response time, and improved outage scenario modeling.

- **Storm Central:** The Storm Central SharePoint site has evolved since it was first rolled out in 2009. Storm Central is a user friendly tool that allows personnel to quickly find the information and tools, developed under the Emergency Response Plan, needed to support the restoration of service to our customers after an emergency event. The home page of the Storm Central site displays:

  - Current outages on the system and the number of customers impacted.

  - Storm model prediction results for cases of trouble anticipated due to impending weather events.

  - Activation status for the six regional command centers in addition to the main Emergency Command Center.

- System status announcements for pre-event and event management conference calls.
- Live weather radar.

Tabs on the Storm Central SharePoint site provide links to additional pages that include:

- The Company's emergency response plan.
- The organization charts, depicting the roles and hierarchy of EU's Emergency Response Organization, which provide links to position specific procedures and checklists.
- A Resource Management page, for special equipment and tools, and identifies the availability and location of these assets.
- Detailed listing of hotels and restaurants within the PPL service territory along with parking and laundry accommodations to support the housing and feeding of mobilized PPL and mutual assistance crews.
- Links to PPL Electric's social media presence and other public information.
- Links to storm rosters and the automatic call-out roster tool.
- Web Forms and work flows to quickly and easily document and share job information during storm restoration.

- **Distribution Automation:** In 2010, PPL Electric launched a "smart grid" pilot project that enables the Company to, react rapidly to changes on the delivery system, and automatically re-route power around problems that occur. The project initially focused on the Harrisburg, Pa. area, but has since been rapidly expanded to cover all of our service territory. The project included the implementation of an advanced Distribution Management Systems (DMS), which is a breakthrough technology that enables our operators to see the real-time status of our distribution network in real-time. Future plans include the installation of thousands of automated smart devices through 2018. Such installations allow for remote operation and monitoring of circuit sectionalizing equipment, and advanced fault location technology. The results of these improvements are threefold:
    - Reduce the number of upstream customers affected by a service outage.
    - Reduce the time necessary to restore customers by transferring circuit sections to alternate sources and limiting long-duration service outages to smaller circuit sections involving fewer customers.
    - Facilitate fault location and reduce the time necessary for repair and restoration.

The end-result will be a delivery system that operates more efficiently, recognizes problems immediately, and responds in seconds to restore the service for many customers who otherwise need to wait for crews to physically respond to an outage.

- **Smart Meter Technology:** PPL Electric is a national leader in the use of advanced metering technology for the benefit of customers, having installed an advanced metering system for all customers between 2002 and 2004. The Company has used the technology to improve the efficiency of responding to service outages – especially during storm emergencies – and as a tool for reliability planning. PPL Electric is embarking on implementing the next generation Advanced Metering Infrastructure (AMI) beginning in 2015 pending PUC approval. The four year project will replace the existing power line carrier based system with a radio frequency based communication network that will allow for even more improvements in outage detection and restoration as well as proactive reliability planning and customer service.

***PPL Electric Reliability Results***

The reliability planning and investment process employed by PPL Electric has been very effective, as evidenced by reliability performance being maintained at the benchmark levels and below the standards that existed prior to the Electricity Generation Customer Choice and Competition Act ("Customer Choice Act"). This has been accomplished while preserving a reasonable cost of providing service.

| | PUC Benchmark | PUC 36 Month Standard | PUC 12 Month Standard | 1999-2013 Avg (Since benchmark period) | 2011-2013 3 Yr Avg |
|---|---|---|---|---|---|
| SAIFI | 0.98 | 1.08 | 1.18 | 1.02 | 0.99 |
| SAIDI | 142 | 172 | 205 | 142 | 138 |
| CAIDI | 145 | 160 | 174 | 138 | 137 |

**Figure 2: PPL Electric Reliability Metrics**

***PPL Electric Reliability Planning Process***

PPL Electric's process is forward-looking and proactive. It consists of the following:

- Analyze the historical trends of causes of service outages and other power service problems.
- Identify the drivers of those trends.
- Forecast future reliability metrics (SAIDI, SAIFI, and CAIDI) given existing mitigation programs' effect on the identified drivers.

- Identify new programs, policies and activities to add to or substitute for existing mitigation programs to avoid any forecasted gaps between future reliability and the desired levels.
- Identify, evaluate and implement new technologies that enhance its condition monitoring strategy
- Continually evaluate and adjust programs, policies and activities to produce the desired future results.
- The resulting portfolio of existing and new programs, policies and activities are incorporated in PPL Electric's five-year business plan.
- This I&M Plan is a subset of PPL Electric's five-year business plan.

***PPL Electric Reliability Analysis***

Identification and understanding of trends creates the opportunity to plan programs to mitigate undesirable trends. Most of the year-to-year variation in service interruptions is explained by differences in storm experience. Therefore, PPL Electric generally removes all storm caused service outages for internal analysis to identify other causal trends affecting reliability. Each data point in the following charts represents a 12-month ending value to eliminate the effect of seasonal variation.

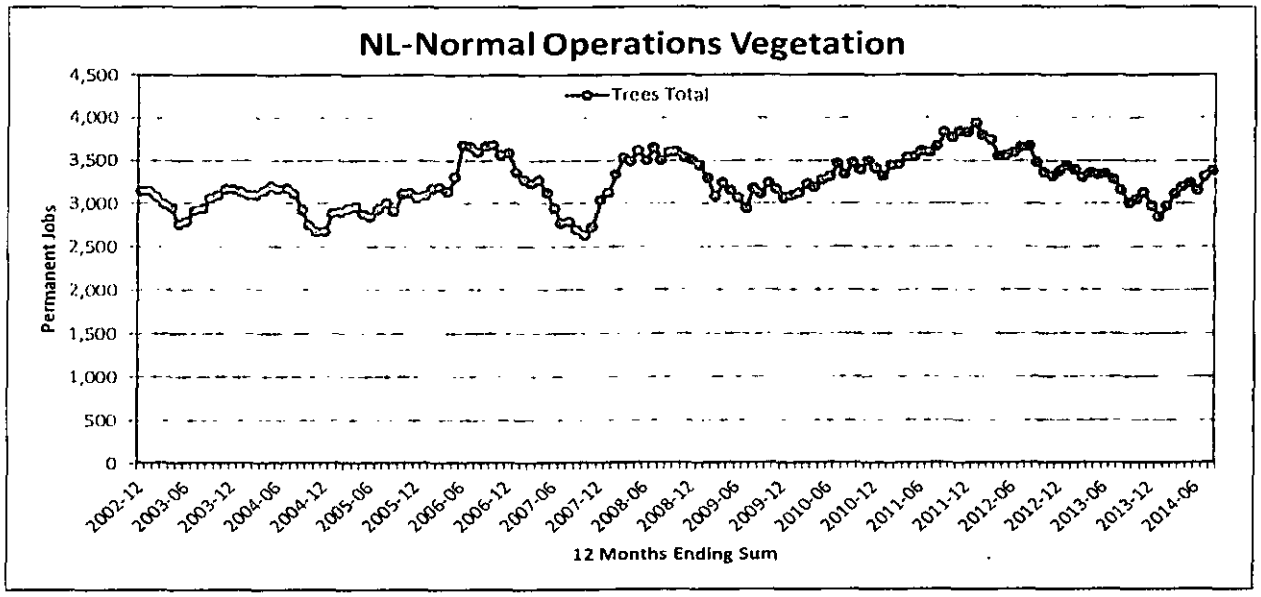



**Figure 3: Vegetation Related Service Interruption Cases**

The long-term trend in tree-related outages had been climbing. However, an increased focus on tree-trimming and increased funding for a more aggressive trimming specification has brought the trend

down significantly from the twelve year high in 2011. PPL Electric is committed to continuing our new and aggressive tree trimming program to address the threat of tree caused outages in our current 5-year business plan. Weather plays a larger role with vegetation-related service interruptions than other causes: even with storms removed, approximately 66% of normal operation service interruptions due to vegetation take place during adverse weather conditions.

A significant risk to PPL Electric's ability to meet reliability benchmarks is the large portion of distribution facilities, which were installed in the 1960's and 1970's, that are now beyond or nearing the end of their design lifetime. See Appendix A for average age of major units of property. The resultant effect on non-storm-related equipment failure is illustrated by the chart in Figure 4 below.

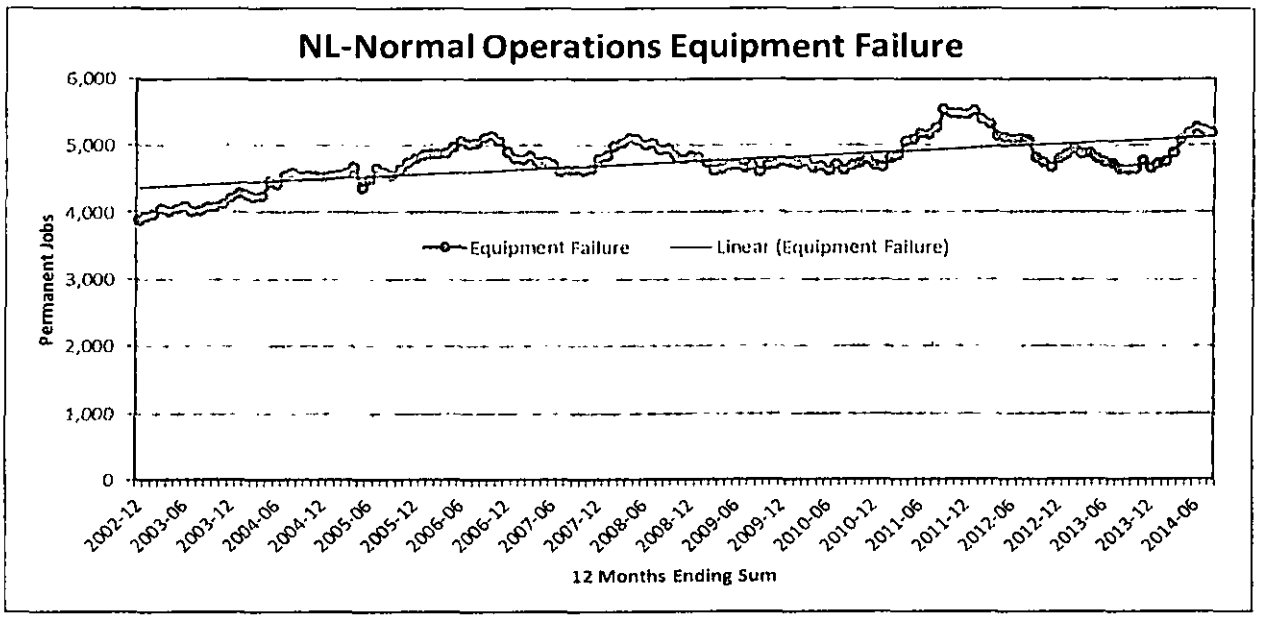



**Figure 4: Equipment Failure Service Interruption Cases**

The annual number of outages due to equipment failure rose steadily through mid-2011 and has generally stabilized or declined since then.

Programs contributing to this stabilization are equipment replacements identified through Expanded Operational Reviews of 25% of circuits annually, aggressive worst performing circuit remediation, implementation of PPL Electric's Asset Optimization Strategy, enhanced pole inspection and treatment, Distribution Automation including a new Distribution Management System, and the reintroduction of infrared inspections.

Although these programs have successfully slowed equipment failure growth rates in the short-term, PPL Electric faces a long-term challenge regarding aging infrastructure. PPL is committed to mitigating the aging infrastructure challenge through effective use of proactive replacement

programs. Scheduled replacement of that infrastructure is necessary to avoid accelerating failure rates due to end of life fatigue.

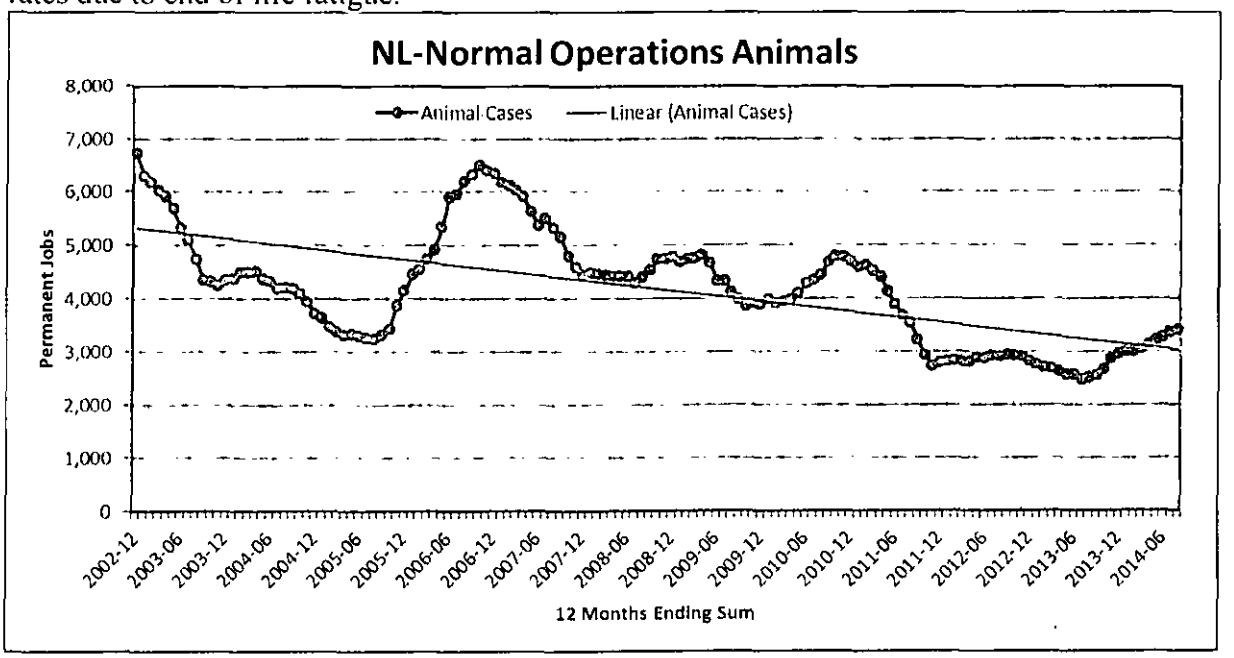



***Figure 5: Animal Related Service Interruption Cases***

PPL Electric has effectively reduced the impact of animal caused outages through the development of targeted distribution and substation animal guarding programs as shown in figure 5 above. The customer impact of animal caused outages continues to decline compared to other key reliability factors.

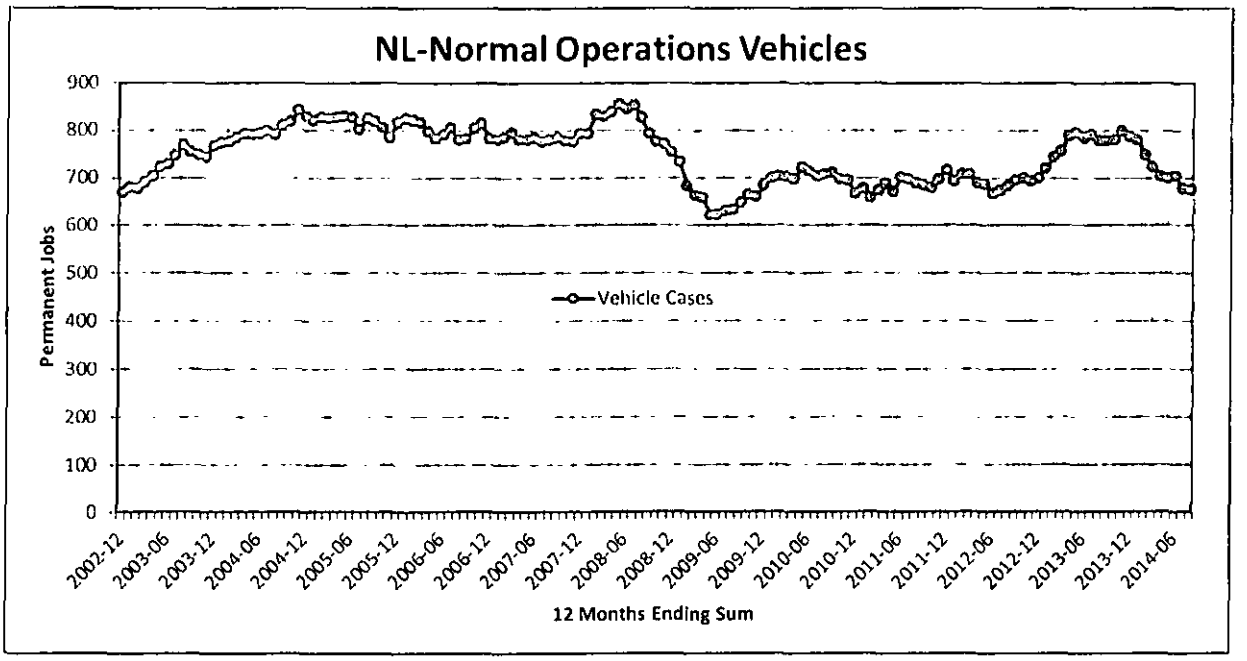



**Figure 6: Vehicle Related Service Interruption Cases**

The long-term trend (see Figure 6) in vehicle-related cases indicates a fairly steady, slightly downward trend with some volatility, such as the elevated 2013 levels. PPL Electric identifies facilities with multiple vehicle hits and evaluates them for potential relocation.

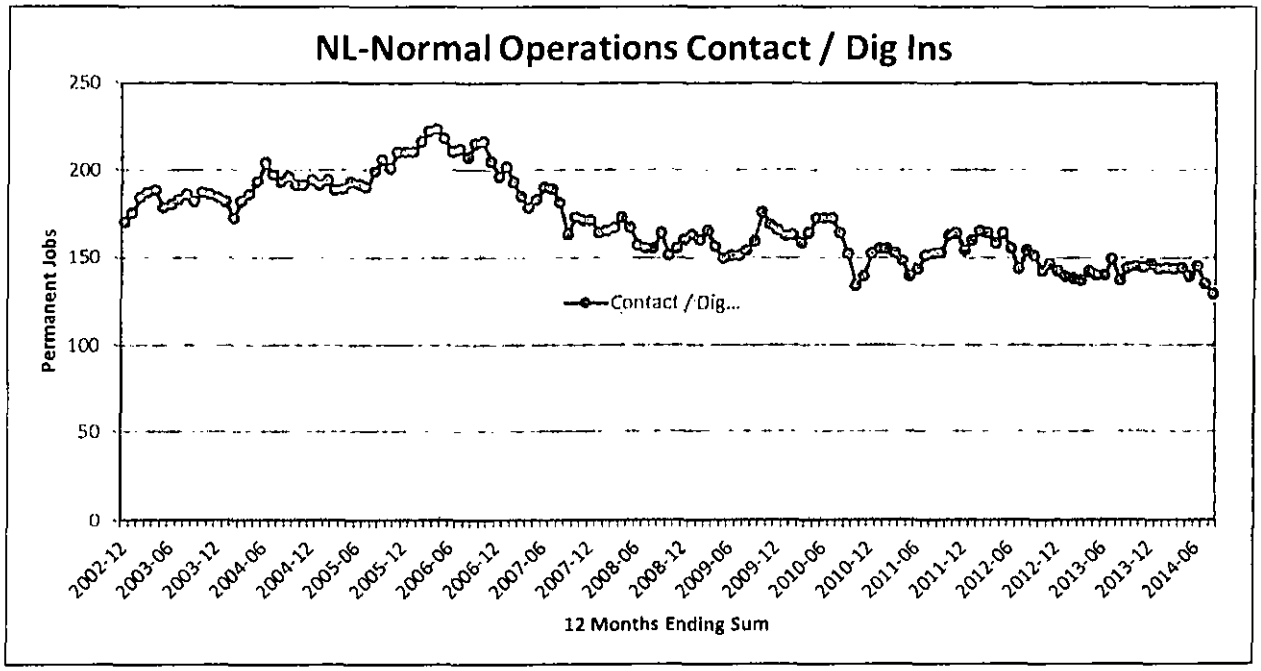



**Figure 7: Overhead Contact/Underground Dig-in Service Interruption Cases**

Overhead contacts and underground dig-ins generally are the result of construction activity around distribution facilities. The incidence of these events has generally declined (see Figure 7).

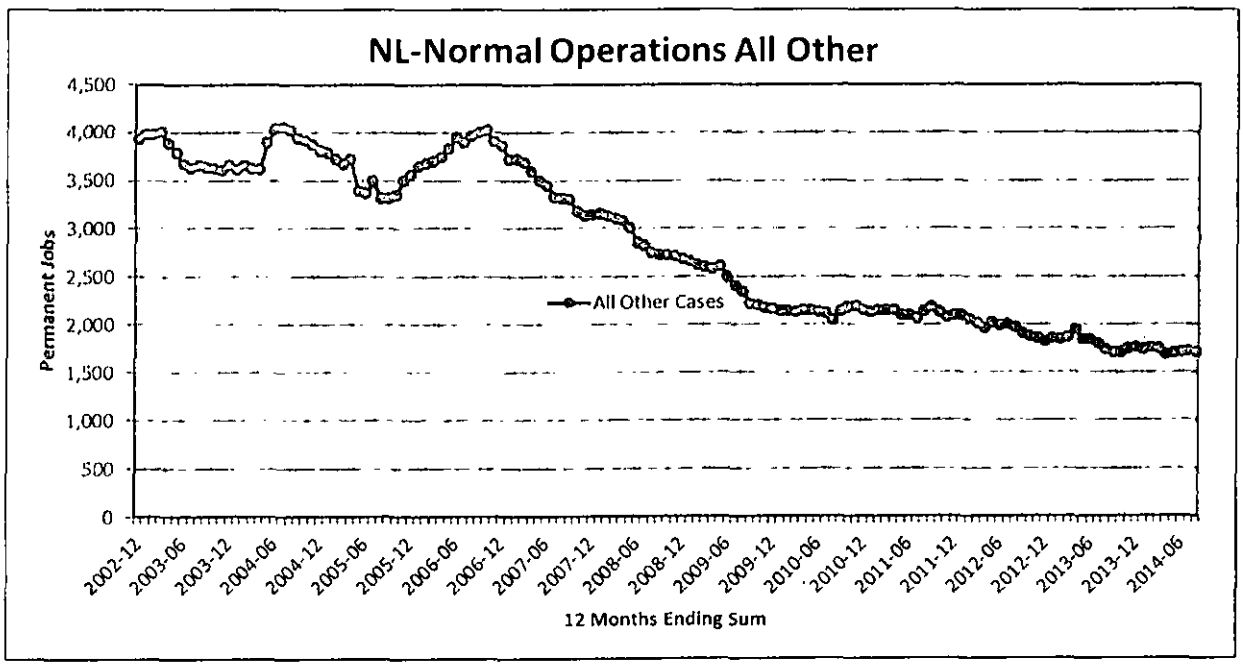



**Figure 8: All Other Causes Service Interruption Cases**

Service interruptions due to all other causes have declined (see Figure 8) since 2006.

Reliability is the largest contributor to overall customer satisfaction and satisfaction levels vary depending upon the amount of information provided to the customer regarding their outage. Providing customers with accurate information about their outage is increasingly important. Customers are more understanding of storm and weather-related service outage impacts than they are of other outage causes, such as utility equipment failures. But since not all customers get information about their outage, outage duration remains more important than the value of outage information, like the cause of the outage. Hence it is still prudent that analyses be conducted to determine the most cost-effective programs to reduce durations.

If it is more cost-effective to offset an increase in equipment failure cases with a program to reduce vegetation-related cases, the ratepayer is better served by this cost-effective choice. Similarly, if a program that reduces the average number of customers affected by each service outage is more cost-effective than a program to reduce the gross number of service outages, the more cost-effective program should be chosen. The management challenge is to maintain reliability within acceptable parameters in the most cost-effective manner.

***52. Pa. Code § 57.198 (b) Plan Consistency***

PPL Electric's I&M plan is consistent with the National Electric Safety Code ("NESC"), Codes and Practices of the Institute of Electrical and Electronic Engineers, Federal Energy Regulatory Commission Regulations ("FERC") and the provisions of the American National Standards Institute, Inc ("ANSI").

***52. Pa. Code § 57.198 (c) Time Frame Deviations***

PPL Electric is again requesting acceptance of the following deviations from the intervals in the Commission standard as were included in the two previous I&M filings (2012-2013 and 2014-2015):

- Section 57.198 (n)(2). Pole Inspections. (vi) A load calculation. See the justification set forth on page 20.
- Section 57.198 (n)(4). Distribution overhead line inspections. See the justification set forth on page 24.
- Section 57.198 (n)(6). Distribution transformer inspections. See the justification set forth on page 33.

PPL Electric is requesting acceptance of the following deviations from the intervals in the Commission standard:

- Section 57.198 (n)(7). Recloser inspections. See the justification set forth on page 34.

***52. Pa. Code § 57.198 (m) Recordkeeping***

Inspection and maintenance activities performed by PPL Electric employees are tracked by electronic work requests in the Company's Work & Asset Management System (WAM) software application which date-stamps transactions and captures an electronic signature of the employee certifying completion.

Inspection and maintenance activities performed by PPL Electric contractors are documented with itemized records, which identify when and what type of work was performed, before invoices for the work are paid.

***52. Pa. Code § 57.198 (n)(1). Vegetation Management.*** *The Statewide minimum inspection and treatment cycle for vegetation management is between 4-8 years for distribution facilities. An EDC shall submit a condition-based plan for vegetation management for its distribution system facilities explaining its treatment cycle.*

Program Description

All PPL rights-of-way shall be maintained to the originally established clearances or the limits as defined in the right-of-way agreement, whichever is greater.

PPL Electric currently employs four-year and five-year inspect and trim cycles for its southern and northern territories respectively. The demarcation line for the northern and southern areas is the Blue Mountains which does not follow the borders of PPL Electric's regions. Based on conditions the cycle schedule may be modified, but not beyond established requirements. Additionally, a three-year inspect and trim cycle is currently applied to transmission lines in PPL Electric service territories.

- Purpose

Taller species of trees that are permitted to grow under power lines eventually will contact the wires, causing service interruptions and unsafe conditions. It is necessary for PPL Electric to trim or remove these trees to continue safe and reliable electric service

To safeguard the reliability of its electric distribution system, PPL Electric has developed a comprehensive program to manage vegetation around power lines. Keeping trees and other vegetation away from high-voltage lines is very important. If trees touch these lines, there can be short-circuits and widespread service outages.

- Process

Distribution

Multi-Phase shall be pruned to the full extent of the established tree line, not to exceed 25' from centerline and shall be ground to sky pruning.

Single Phase shall be pruned to the full extent of the established tree line, not to exceed 15' from centerline and to a distance of 15' above the line. All dead or structurally weak limbs which could fall or blow into the conductor shall be removed regardless of their distance above the conductor.

Exceptions: Trees on the opposite side of any thoroughfare, where normal line construction exists (not alley arms), should be considered for proper lateral pruning using the centerline of the thoroughfare as a guideline. Fast growing trees (ex. Silver maples, Willows and Chinese Elms) may need more aggressive pruning.

Another enhancement is hazard tree removal. "Hazard trees" are those trees outside the right of way that may be leaning, diseased, or otherwise pose a threat of falling on a distribution line. PPL Electric bears all costs of removing hazard trees and conducts the removal either based on right of way agreements or with property owner permission.

Transmission

Since 2010, PPL Electric has taken a more aggressive approach toward vegetation management. Along 500 and 230 kilovolt lines the industry best practice strategy of Wire Zone-Border Zone was implemented. Lines maintained under this strategy allow for only grass under the wires (the Wire Zone) and only low-growing compatible trees and shrubs along the sides (the Border Zone) of the lines. Similar methods are implemented are lower class voltages of transmission lines. However, when feasible, in residential areas lower growing compatible vegetation is not removed.

Inspection Plan

| **Distribution Vegetation Management** | | | |
|---|---|---|---|
| | **Area** *(Line Miles)* | **Scheduled Trimming** *(Line Miles)* | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *Total Line Miles (28,094)* | Lehigh (3,469) | 855 | 919 |
| | Northeast (5,190) | 1030 | 1018 |
| | Central (4,535) | 768 | 1076 |
| | Susquehanna (5,769) | 1130 | 1128 |
| | Harrisburg (4,822) | 1418 | 1186 |
| | Lancaster (4,309) | 1164 | 1051 |
| | Totals | **6365** | **6378** |

***52. Pa. Code § 57.198 (n)(2). Pole Inspections.*** *Distribution poles shall be inspected at least as often as every 10-12 years except for the new southern yellow pine creosoted utility poles which shall be initially inspected within 25 years, then within 12 years annually after the initial inspection. Pole inspections must include:*

*(i) Drill tests at and below ground level.*
*(ii) A shell test.*
*(iii) Visual inspection for holes or evidence of insect infestation.*
*(iv) Visual inspection for evidence of unauthorized backfilling or excavation near the pole.*
*(v) Visual inspection for signs of lightning strikes.*
*(vi) A load calculation.*

Program Description

- Cycle

  Every ten years.

- Purpose

  Distribution poles are inspected to identify and measure the extent of decay and defects that may adversely affect safety or service reliability.

- Process

  Each pole is partially excavated (two holes on opposite sides of the pole). The pole is inspected visually, sounded and bored above ground in addition to the partial excavation. If decay is present, a full excavation 360 degrees around the pole is done. All measurable decay is entered into the contractor's engineering-based software program to determine the percentage of remaining strength, taking into consideration ANSI and NESC standards. If the percentage of remaining strength is below established parameters, a load calculation is performed to determine the pole's capacity to support the load in accordance with NESC standards.

  Based upon the inspection and testing results, the pole is treated with a preservative, reinforced (by truss or fiber wrap) or replaced.

- Justification

  PPL Electric's pole inspection program generally complies with the intervals set forth in 52. Pa. Code §57.198 (n)(2), NESC rules and is consistent with industry practices.

  PPL Electric hereby proposes a deviation from the requirement for a load calculation to be performed for each pole inspected. The design of PPL Electric's lines is based on its Distribution Engineering Instructions which are based upon NESC heavy loading conditions. These instructions provide adequate safety factors such that the allowable

percentage of strength reduction does not compromise the ability of the pole to support the load. PPL Electric requires entities attaching facilities to its poles to perform their own load calculations before making the attachment. Load calculations are performed on poles when the estimated percentage of remaining strength falls below established parameters.

PPL Electric does not track service outages caused by pole equipment failure as a discrete category. Poles are contained within a category that includes poles arms, brackets, guys, push braces, pole top extensions and any other mounting hardware. In 2013, equipment failures requiring replacement in this category amounted to 729 (5.1% of total cases), of which only a small fraction are poles. Excluding pole fires, text comments in only 44 cases (0.3% of total cases) suggest broken PPL Electric-owned poles. Fifty-five poles represent less than 1/100 of one percent of PPL Electric's 880,000 wood distribution pole inventory. Most of the limited numbers of pole failures are aggravated by weather conditions such as trees being blown into lines, so the potential risk reduction through a load calculation is insignificant.

Beginning in 2010, the Company's wood pole maintenance program was enhanced from an inspection-only process to an inspection and treat program, whereby all poles passing the inspection are chemically treated to arrest decay at the same visit. The preservative treatment permits the next inspection to be at a uniform ten years, rather than the former one to nine-year cycle after original inspection applied to individual poles. Changing to a uniform ten-year cycle will enable more economic geographic-based inspections where all poles in a defined area are inspected, rather than the current method of inspecting scattered poles with individually specified intervals which maximizes the employee travel involved.

Inspection Plan

In order to convert from the former variable inspection interval (where the annual scope varied from 5 to 15% of inventory) to a uniform interval, a higher number of poles than the steady-state value of approximately 10% of inventory are required in the early years. For the first cycle, geographic areas have to be defined in order to group together a sizeable portion of poles with similar inspection due dates. Because this will not be completed until just before the beginning of each year of the first cycle, the regional breakdown of the annual scope will be unknown at the time of this plan's submission. The regional breakdown will be provided in the Annual Reliability Reports for the preceding years.

# PPL Electric Utilities Corporation

| Distribution Wood Pole Inspections | | | |
|---|---|---|---|
| | **Area** *(Poles)* | **Inspections Planned** *(Poles)* | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *Total Poles (880,556)* | Lehigh (117,671) | TBD | TBD |
| | Northeast (174,671) | TBD | TBD |
| | Central (157,682) | TBD | TBD |
| | Susquehanna (160,178) | TBD | TBD |
| | Harrisburg (139,540) | TBD | TBD |
| | Lancaster (130,814) | TBD | TBD |
| | Totals | **113,700** | **113,700** |

***52. Pa. Code § 57.198 (n)(3). Pole inspection failure.*** *If a pole fails the groundline inspection and shows dangerous conditions that are an immediate risk to public or employee safety or conditions affecting the integrity of the circuit, the pole shall be replaced within 30 days of the date of inspection.*

Corrective Maintenance

- Pole replacement data is provided to PPL Electric weekly. Critical poles, those that carry ≤5% remaining strength or those that pose an immediate safety concern, are reinforced or replaced as soon as possible, but no later than 30 days after notification. Other non-restorable rejected poles generally are replaced within one year of identification. Pole strength and loading calculations are provided for each rejected pole to assist in reinforce versus replace decisions and schedule prioritization.

- Reinforcement by steel C-Truss, a galvanized steel truss which is banded around the pole in order to regain the pole's original strength or fiber wrap, several layers of high-strength fiberglass wrapped onto the pole and saturated with resin is completed within 90 days of identification. The method of reinforcement is determined by the circumstances and/or location of the pole.

***52. Pa. Code § 57.198 (n)(4). Distribution overhead line inspections.*** *Distribution lines shall be inspected by ground patrol a minimum of once every 1-2 years. A visual inspection must include checking for:*

*(i) Broken insulators.*
*(ii) Conditions that may adversely affect operation of the overhead transformer.*
*(iii) Other conditions that may adversely affect operation of the overhead distribution line.*

Program Description

- Cycle

Infrared inspection: 3-phase and 2-phase overhead lines adjacent to roadways every two years.

Visual inspection: Condition based – selected line segments. Inspections are scheduled under various conditions to include CEMI and WPC circuits, if warranted based on EORs, and if power quality issues are experienced. Additional patrols used to ensure continued reliability include those in support of distribution construction projects as well as summer and winter readiness patrols.

Pole inspection (see page 20): Every ten years.

- Purpose

The objective of an overhead line inspection is to identify and correct hardware or equipment defects that may lead to a future service interruption or pose a safety hazard. Defects are identified by inspection, ranked in order of priority and scheduled for repair.

- Process

Infrared: Multi-phase distribution lines adjacent to roadways are scanned from vehicles. A roof-mounted infrared camera is employed to capture a thermal image of components carrying electrical current. Heat emission measurements are compared to reference temperatures. Probability of failure is estimated based upon the magnitude of temperature difference from reference. The method detects problems in current carrying components such as transformers, connections, splices, hot line clamps, disconnects,

switches, lightning arresters, bridges disconnects, terminators, etc., whether or not there are visible defects. A detailed report of findings is prepared. At-risk items are prioritized and mitigated by repair or replacement.

Visual: An analysis of actual service interruptions is conducted on selected circuits (e.g., poor performing circuits as measured by PPL Electric's CPI, circuits with excessive customers experiencing multiple service interruptions ("CEMI"), and circuits undergoing expanded operational reviews. If that analysis indicates that a pattern of equipment failure exists, a visual line inspection is scheduled. In addition to looking for visible defects in current-carrying components, visual inspection looks for mechanical defects in anchors, guys, crossarms, insulators, offset brackets, grounding systems and poles.

Pole Inspection: As an integral part of the ten-year pole inspection process, the inspector observes, notes and reports at-risk conditions of all pole attachments, specifically crossarms, braces, conductors, transformers, fuse cutouts, lightning arresters, reclosers, regulators, capacitors, switches, wildlife protection, vegetation encroachment, guys, anchors, ground wires and rods.

- Justification

PPL Electric hereby proposes a continued deviation from the 1-2 year inspection cycle on the basis of an effectiveness evaluation and cost benefit analysis in favor of the program described herein. Resources that would be applied to shorter visual cycles than this proposal would reduce the resources applied to other more cost-effective reliability programs described in this plan.

PPL Electric conducted a trial of infrared inspections of multi-phase lines in 2006. The trial inspections cost $122,500 and identified repairs costing $100,000, saving an estimated 1,460,000-2,600,000 CMI, at a cost of $0.15 to $0.09 per CMI saved. PPL Electric restructured the infrared service contract gaining further efficiencies in 2014. The cost benefit has not yet been quantified as the year end effectiveness review is yet to be completed.

PPL Electric employs a $2.00 per CMI saved cost threshold[1] as a principal criteria for evaluating new projects for inclusion in the portfolio of reliability programs. Costs below

[1] Cost threshold recommended by Richard E. Brown, Sr. Vice President and co-founder of Quanta Technology, a firm specializing in technical and management consulting for utilities. Dr. Brown has provided consulting services to most major utilities in the U.S. Dr. Brown has published more than 90 technical papers related to asset management and is the author of Electric Power Distribution Reliability, CRC Press, 2009.

that threshold are generally considered to be prudent investments, while those above typically provide less benefit for the cost. The cost threshold assists in applying finite resources to programs producing better results, thus enabling the most effective portfolio of programs. Because infrared costs per CMI saved are well below the threshold, PPL Electric instituted a two-year infrared cycle for accessible multi-phase lines.

PPL Electric conducted an overhead line visual inspection cost benefit study in 2010. The study calculated a reliability benefit as a probability that inspections and the associated repairs will reduce equipment failure service interruptions. The overall probability is the product of (a) the probability that an equipment failure service outage is preceded by a visible condition, (b) the probability that the visible condition exists at the time of inspection, (c) the probability that an inspector actually detects a condition that exists and (d) the probability that the condition is repaired before a service interruption occurs. For seven of the thirteen overhead distribution component codes, actual inspection data established little likelihood of visible conditions preceding failure. For the remaining six component codes, subject matter experts were surveyed. The resulting probability estimates were applied to actual service outage data to estimate avoided CMI per mile. The inspection and repair cost per mile divided by CMI avoided per mile yielded an estimate of cost per CMI avoided. Figure 8 shows these costs per CMI for various inspection intervals.

The study also estimated avoided CMI/mile for visual inspections that follow infrared inspections because there is significant overlap between the two methods: infrared identifies both visible and hidden defects in current carrying components, while visual inspection detects only visible defects in electrical and mechanical components. Figure 9 shows these costs per CMI for various inspection intervals.

As Figure 9 shows, given PPL Electric's reliability parameters, there is no interval for visual overhead inspections that meets the established cost threshold, particularly when performed in conjunction with infrared inspections. Visual inspections alone at two-year intervals are 50% above the threshold; two year visuals done in conjunction with infrared are 100% above the threshold.

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As reported by Doug Staszesky, Director –Product Management, S&C Electric Company, in his presentation *"Distribution Automation – An Overview,"* common thresholds vary from $1.5 to 3.0 million per SAIDI minute saved, which translates to $1.08 to $2.17 per CMI for PPL Electric.

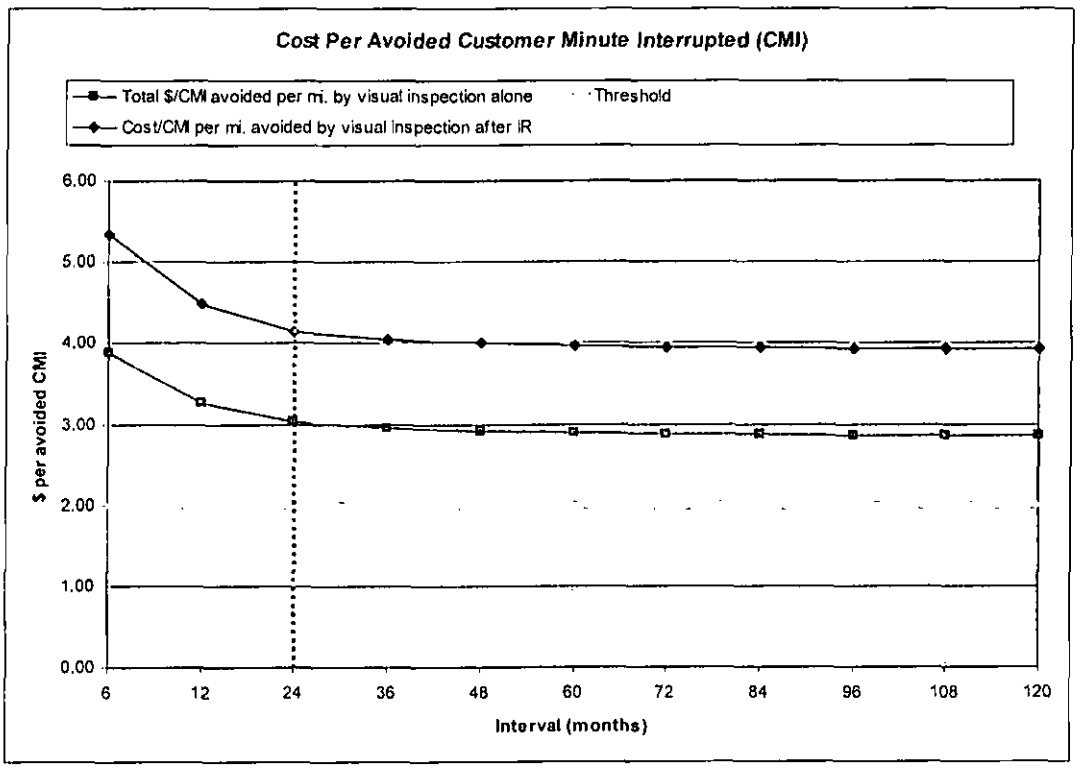



**Figure 9: Overhead Line Inspection Cost per Avoided CMI**

Although universal overhead visual inspections are not cost-effective, targeted visual inspections have more value. Figure 10 shows that in a typical year, less than 15% of the circuits are responsible for 80% of equipment failure CMI. For the period 2002 to 2009, 30% of the circuits were responsible for 80% of equipment failure CMI.

Consequently, PPL Electric employs the condition-based visual inspection approach described above, combined with Expanded Operational Review (see page 7) field checks and overhead inspections in conjunction with pole inspections. The efficacy of this approach is confirmed by the flattening of the growth curve of equipment failures discussed on page 12.

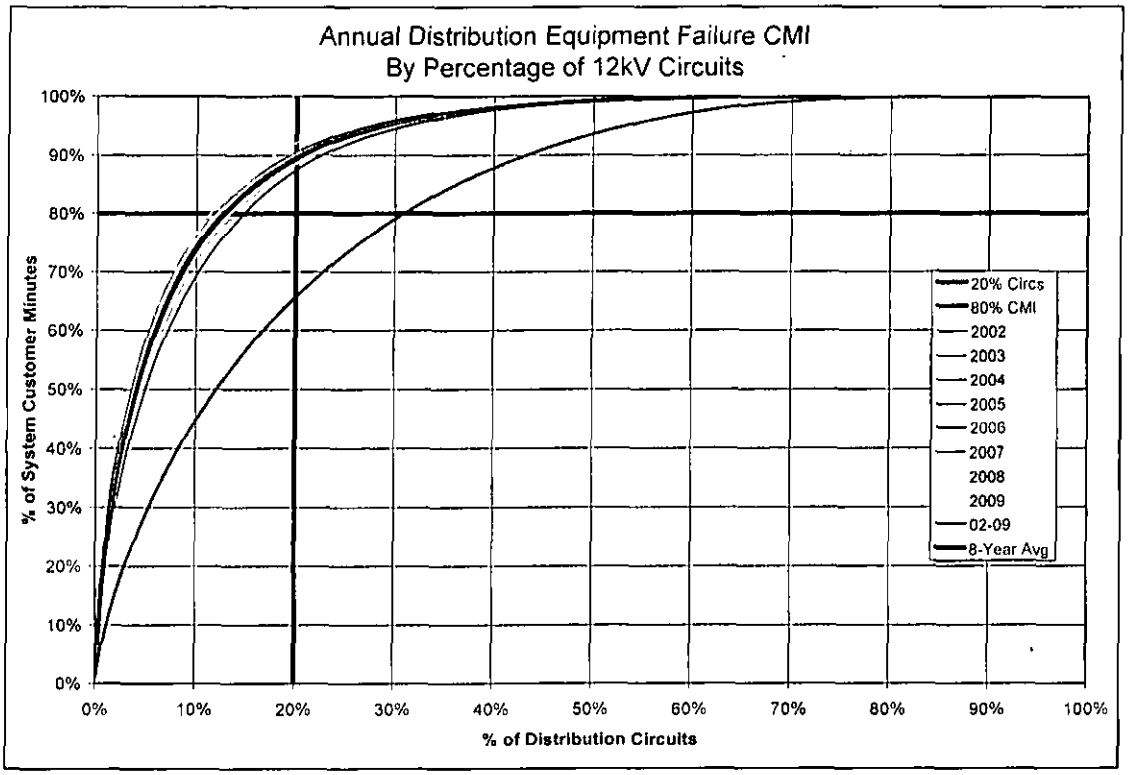



**Figure 10: Cumulative Circuit Contribution to Equipment Failure CMI (excluding Major Events only)**

- Evaluation of new technologies

  PPL Electric consistently looks to enhance its inspection programs by evaluating new technologies. Of recent note, in 2013, a Radio Frequency (RF) Line Inspection program was piloted to determine the technology's ability to cost effectively provide a means of predictive maintenance for distribution equipment. The technology and services are designed to proactively detect failing equipment. The technical results of the pilot were inconclusive and the cost effectiveness was low compared to existing inspection methods. The number of findings per line mile identified through RF technology was about one-fourth that of infrared. The cost per line mile is approximately three times that of infrared. Additionally, the majority of components identified do not historically cause extensive outages compared to the defective components found by infrared. The pilot was inconclusive in that the results could not translate the emission of signature by a component to quantifiable measures of how degraded the component may be or the remaining using life of the component.

# PPL Electric Utilities Corporation

Inspection Plan

| Distribution Overhead Multi-phase Line Infrared Inspections | | | |
|---|---|---|---|
| *Total Line Miles/Drivable Line Miles*[2] | **Line Miles by Region** | **Infrared Inspections Planned** *(Line Miles)* | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *(Total System Line Miles: 8,626/8,195)* | Lehigh (1,337/1,270) | 635 | 635 |
| | Northeast (1,446/1,374) | 687 | 687 |
| | Central (1,618/1,537) | 768 | 769 |
| | Susquehanna (1,264/1,201) | 601 | 600 |
| | Harrisburg (1,411/1,340) | 670 | 670 |
| | Lancaster (1,550/1,473) | 737 | 736 |
| | Annual totals | **4,098** | **4,097** |

[2] For planning purposes, an assumption that 95% of multi-phase line miles are drivable is employed.

## PPL Electric Utilities Corporation

| Distribution Overhead Visual Inspections | | | |
|---|---|---|---|
| | **Line Miles by Region** | **Estimated Visual Inspections** *(Line Miles)* | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *Total System Line Miles (28,094)* | Lehigh (3,469) | 390 | 390 |
| | Northeast (5,190) | 540 | 540 |
| | Central (4,535) | 480 | 480 |
| | Susquehanna (5,769) | 600 | 600 |
| | Harrisburg (4,822) | 510 | 510 |
| | Lancaster (4,309) | 480 | 480 |
| | **Annual totals** | **3,000** | **3,000** |

Pole Inspection: See page 20.

***52. Pa. Code § 57.198 (n)(5). Inspection failure.*** *If critical maintenance problems are found that affect the integrity of the circuits, they shall be repaired or replaced no later than 30 days from discovery.*

Corrective Maintenance Description

- Infrared

  Priorities for corrective maintenance are determined by the magnitude of the variance from normal operating temperature.

| Distribution Overhead Infrared Inspections Corrective Maintenance | | |
|---|---|---|
| | **Variance from Normal Operating Temp.** | **Days Allowed After Report Receipt for Service** |
| **Secondaries** | +20-60° C | 8 weeks |
| | > +60° C | 2 weeks |
| **Disconnect Switches** | +20-60° C | 8 weeks |
| | > +60° C | 2 weeks |
| **All Other Facilities** | +10-40° C | 8 weeks |
| | > +40° C | 2 weeks |

- Visual

  The inspector determines the urgency for repairs and assigns an appropriate order of priority from three categories (Emergency, Priority and Unsatisfactory) described below.

| Distribution Overhead Visual Inspections Corrective Maintenance | | | |
|---|---|---|---|
| **Definition** | **I&M Standard** | **Work Type** | **Description** |
| Emergency; Defects which: (1) Threaten the safety of the public or employees; or (2) Will cause a service *interruption at any moment.* | Corrective Action taken Immediately | Conductor | Dislodged Energized Wire |
| | | Conductor | Phase Wire on Crossarm |
| | | Xfmr/Device | Oil Leaking from Equipment |
| | | Pole | Cracked/Deteriorated - Severe (i.e. Vehicle Hit & Run) |
| | | Crossarm | Cracked/Deteriorated - Severe (Arm is broken and hanging, etc) |
| | | Conductor | Missing APD's w/ > 90% Conductor Strand Damage |
| | | | |
| Priority; Defects with a high probability of causing a service interruption if not corrected promptly. | Corrective action must be taken within 30 days. | *Insulator* | *Cracked or Broken* |
| | | Cutout | Cracked or Broken |
| | | Crossarm | Cracked/Deteriorated - Heavy |
| | | Conductor | Missing APD's w/ > 50% Conductor Strand Damage |
| | | | |
| Unsatisfactory; Defects with a lower probability of causing a service interruption if not corrected promptly. | Corrective action must be taken within 3 months. | Hardware | Failed LA |
| | | Guy | Guy wire broken/missing, Rod Slipped or Lead Loose |
| | | Insulator | Tracking |
| | | Conductor | Broken Strands |
| | | Conductor | Missing APD's w/ > 20% Conductor Strand Damage |
| | | Conductor | Broken Tie Wire |
| | | Pole | Cracked/Deteriorated - Heavy |
| | | Crossarm | Cracked/Deteriorated - Moderate (Split Total Length) |
| | | Cutout | Arc Shield Deteriorated |
| | | Hardware | Missing Cotter Pins |

***52. Pa. Code § 57.198 (n)(6). Distribution transformer inspections.*** *Overhead distribution transformers shall be visually inspected as part of the distribution line inspection every 1-2 years. Above-ground pad-mounted transformers shall be inspected at least as often as every 5 years and below-ground transformers shall be inspected at least as often as every 8 years. An inspection must include checking for:*

*(i) Rust, dents or other evidence of contact.*
*(ii) Leaking oil.*

*(iii) Installation of fences or shrubbery that could adversely affect access to and operation of the transformer.*
*(iv) Unauthorized excavation or changes in grade near the transformer.*

Program Description

- Cycle

  Overhead: Condition based – selected line segments. Overhead transformers are inspected as part of overhead visual line inspections (see page 23), infrared inspections, and pole inspections (see page 20). Additionally, load profiles are analyzed to identify and remedy overhead transformer locations that have consistent load demands exceeding design parameters.

  Pad-mount and below-ground: Condition based – selected line segments. Inspections are scheduled when indicated by circuit performance, as measured by PPL Electric's Circuit Performance Index (CPI) and confirmed by an analysis of actual service interruptions that identifies underground failures addressable by visual inspection.

  Pad-mount and below-ground transformers also are inspected as part of the underground residential development (URD) cable testing, replacement and curing program, which tests approximately 500 sections per year and cures approximately 600 sections per year.

  During 2012, PPL Electric performed a pilot of single phase pad-mounted transformer inspections of some of the older underground residential developments. The result was that, apart from some minor rusting, the conditions of the pad-mount transformers were in good working condition. These transformers were generally reliable so a formal inspection program would add little reliability benefit for excessive costs to the customer as outlined in the justification.

- Purpose

  The objective of a transformer inspection is to identify and correct hardware or equipment defects that may lead to a future service interruption or pose a safety hazard. Defects are identified by inspection, ranked in order of priority and scheduled for repair.

- Process

  Overhead and underground transformers are visually inspected for damage (rust, dents, cracks, locking devices, broken bushings, etc.), integrity of connections and leaks. In addition, pad-mounts and below-ground transformers have cables and elbows inspected for deterioration, foundations and covers inspected and animals, nests, cobwebs and vegetation removed.

- Justification

  PPL Electric hereby proposes a continued deviation from the fixed inspection cycle for transformers in favor of the condition-based inspection program described herein.

  The overhead line inspection cost benefit study described on page 24 estimated that about 20,000 CMI annually could be saved via visual overhead transformer inspections. The estimated cost to inspect those transformers every two years would be $1.3 million or $65 per CMI avoided, well above the threshold employed by PPL Electric of $2.00 per CMI saved (see footnote 1, page 24) for identifying prudent reliability investments. Costs below that threshold are considered to be prudent investments, while those above typically provide less benefit for the cost. The cost threshold assists in applying finite resources to programs producing better results, thus enabling the most effective portfolio of programs.

  Similarly pad-mount transformers only contribute 500,000 CMI on average to overall system reliability. An inspection and maintenance program for transformer condition would cost millions in expense for little improved reliability over other underground reliability improvement programs.

  Resources that would be applied to shorter cycles than this proposal would reduce the resources applied to other more cost-effective reliability programs described in this plan.

***52. Pa. Code § 57.198 (n)(7). Recloser inspections.*** *Three-phase reclosers shall be inspected on a cycle of 8 years or less. Single-phase reclosers shall be inspected as part of the EDC's individual distribution line inspection plan.*

Program Description

- Cycle

- PPL Electric has initiated an upgrade program to replace all three phase OCRs with vacuum circuit reclosers ("VCRs") based upon a review of the dominant failure modes and causes. The newer technology replaces oil with a vacuum as the interrupting media. This eliminates the OCR maintenance issues of carbonized oil, contact deterioration and the timing issues that sometimes occur with OCRs. In addition, the communication capabilities of the devices allows for PPL Electric to track data pertaining to the asset health which will allow PPL Electric to do condition based maintenance on these devices. PPL Electric received approval from the commission on January 3, 2014 to complete these replacements on a 10-year cycle starting in 2015. Three-phase VCRs are subjected to infrared inspection on the same 2-year cycle as OCRs.

Three-phase oil circuit reclosers ("OCR"): 2-year infrared (see page 23); 10-year replacement. In addition, any device with an electronic control is visually inspected every 2 years.

Single-phase OCRs: inspected as part of PPL Electric's distribution line inspection program (see page 23)

- Purpose

The purpose of the recloser replacement program is to ensure the reliable operation of reclosers by

- Process

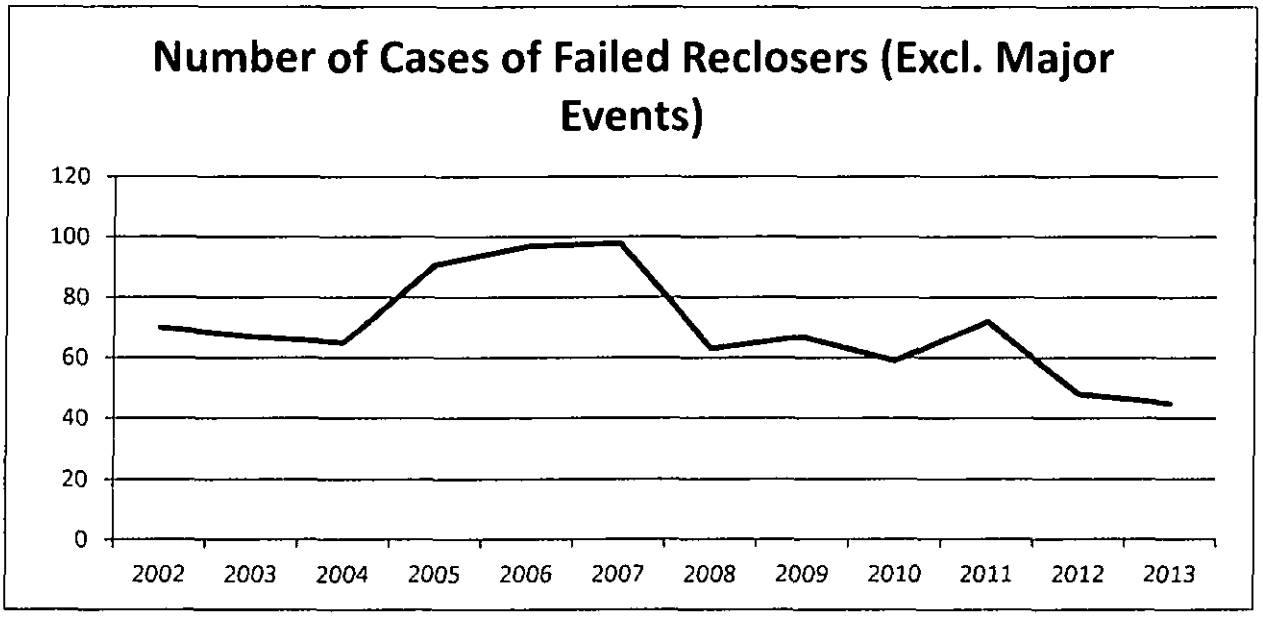
Three-phase oil and vacuum reclosers are included in the two-year infrared line inspection program (see page 23).

Three-phase OCRs are replaced with new communicating VCR units based upon installation date and type.

- Justification

A recloser's function is to isolate faults while minimizing the number of customers affected by permanent service outages. Visual inspection of an OCR provides relatively little useful information about the unit's capability to perform its function compared to testing. Testing in place would require almost all of the same steps that are involved in replacement. Bench testing is preferable to testing in place and refurbishment requires the unit's removal from service. With the planned installation of these communicating vacuum units, the devices have a longer life expectancy, and inspections can be planned. As PPL Electric has been replacing older oil reclosing three phased units, reliability has improved from the decreasing number of failed units. In addition, PPL Electric experienced close to a 50% improvement in reliability within the initial smart grid pilot area.

## PPL Electric Utilities Corporation




Replacement Plan

Actual scope is determined annually based upon the number of OCRs on the system, age, and model type of OCR. The projections below are tentative until replacement recommendations are provided.

| Distribution Three Phase OCR Replacements | | | |
|---|---|---|---|
| | **Area** *(Number of Three Phase OCRs)* | **VCR Replacements Planned** | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *Total Three Phase OCRs (1,070)* | Lehigh (165) | 20 | 11 |
| | Northeast (183) | 11 | 16 |
| | Central (216) | 21 | 22 |
| | Susquehanna (140) | 4 | 19 |
| | Harrisburg (200) | 40 | 25 |
| | Lancaster (166) | 16 | 23 |
| | **Totals** | **112** | **116** |

***52. Pa. Code § 57.198 (n)(8). Substation inspections.*** *Substation equipment, structures and hardware shall be inspected on a cycle of 5 weeks or less.*

Program Description

- Cycle

| | Visual | Infrared |
|---|---|---|
| **Distribution-SCADA Controlled** | Monthly | Annual |
| **Distribution-Non SCADA** | Monthly | Annual |

- Purpose

  Periodic substation inspections verify the integrity of station physical security, record and correct any security breaches, verify the proper fluid levels and gas pressures, and identify any leaks, verify the proper operation of essential station equipment and initiate any necessary corrective actions.

- Process

  Inspection of substation equipment and recording abnormal conditions of the equipment. Equipment inspected includes, but is not limited to:

  - Power transformers
  - Circuit breakers
  - Auxiliary equipment
  - Batteries and chargers
  - Control house
  - Yard and perimeter

- Justification

  The current intervals are supported by a cost benefit analysis last updated in 2007.

# PPL Electric Utilities Corporation

Inspection Plan

| Distribution Substation Visual Inspections | | | |
|---|---|---|---|
| | **Area** *(# of Substations)*[3] | **Inspections Planned** | |
| | | **2016** | **2017** |
| **PPL Electric Utilities Corporation** *Total Substations 354* | Lehigh (62) | 744 | 744 |
| | Northeast (58) | 696 | 696 |
| | Central (67) | 804 | 804 |
| | Susquehanna (46) | 552 | 552 |
| | Harrisburg (60) | 720 | 720 |
| | Lancaster (61) | 732 | 732 |
| | **Totals** | **4,248** | **4,248** |

[3] The number of substations listed includes substations in service as of September 2014 and substations planned for installation through 2016. At the time of filing, no installations are planned for 2017

## *Appendix A: Transmission Programs and Procedures*

| Program | Activity |
|---|---|
| Helicopter Inspections<br>– Routine | Aerial linemen perform annual routine transmission line patrols from a helicopter. They identify damaged or deteriorated equipment and any apparent vegetation issues. Engineers review the findings and develop plans for repair, replacement or remediation. |
| Helicopter Inspections<br>– Comprehensive | Aerial linemen perform an overhead comprehensive inspection of transmission line facilities on a four-year cycle. Detailed condition reports with close-up digital photos are prepared for each specific component problem found along the transmission line and right-of-way. Engineers review the findings and schedule corrective maintenance as needed. |
| Helicopter Inspections<br>– Emergency | Aerial linemen perform patrols of transmission lines that operate abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Because of the nature of this work, corrective actions generally are expedited. |
| Field Inspections<br>– Emergency | Line personnel perform emergency foot patrols to inspect transmission lines that operated abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Due to the nature of this damage, corrective actions generally are expedited. |
| Structures<br>– Inspection, Treatment, Replacement, Reinforcement/Repair | Inspectors examine transmission structures for deterioration and measure the degree of decay and deterioration. Basic treatment is applied to abate further deterioration. Based on the results of the inspection, the structure is either scheduled for a future inspection, reinforcement and/or repair for extended life or replacement. |
| Equipment Maintenance | During helicopter and foot patrols, equipment and facilities are identified that require repairs. Based on need and criticality, repairs are either scheduled or completed as soon as possible. Repairs are either completed by line crews or aerial line crews to ensure efficient and effective repairs. |
| Line Switches<br>– Maintenance and Inspection | Line personnel inspect, maintain and perform operational tests on 138kV and 69kV line air break switches to assure proper operation. |

## PPL Electric Utilities Corporation

| Program | Activity |
|---|---|
| Line Switch Upgrades | Line personnel install lightning arresters on 138kV and 69kV line switches to increase system reliability. Existing parallel break air breaks (PBAB) and load sectionalizing air breaks (LSAB) are being upgraded to motor operated load break air breaks (MOLBAB) to improve switching capabilities, outage restoration times, and sectionalizing ability. |
| Circuit Analysis | Engineers analyze circuit loading and performance to identify areas needing increased line capacity or improved line reliability. |

## *Appendix B: Substation Programs and Procedures*

| Program | Activity |
|---|---|
| Load Survey | Automatic monitoring devices such as SCADA provide continuous, real-time loading information. Engineers review equipment loading and identify facilities and transfer capabilities approaching capacity limits. A portion of the load may be supplied from a different source, the existing facilities may be upgraded, new lines and equipment may be added, or a new substation may be built to address capacity deficiencies. |
| Substation Inspection/Repair | Electricians inspect substations for security and equipment reliability on a time-based maintenance cycle. They identify and correct potential equipment problems before a failure or service interruption occurs. |
| Equipment Service | Electricians perform operational tests on power transformers, load tap changers ("LTC"), voltage regulators, circuit breakers, circuit switchers, vacuum switches, air break switches and transformer protective switches on a time-based maintenance cycle to assure that equipment is operating within established parameters. Equipment serviced includes batteries, battery chargers, protective relays, high voltage fuses and high-speed automatic grounding switches. Depending on the type of equipment, "service" can include actions other than operational testing. |
| Inspection and Condition Assessment | Electricians inspect and perform condition assessments of circuit breakers, wave traps, ground switches, stick-operated disconnects, gang-operated disconnects and motor-operated disconnects on a time-based maintenance cycle to assure proper operation. |
| Insulation Testing | Technicians perform power factor testing on power transformers, potential transformers, lightning arresters, current transformers, select circuit breakers and power cables on a time-based maintenance cycle. Testing also includes other instrument transformers, (CCVTs, coupling capacitors, potential devices, etc.). They also perform high-potential testing on 12kV oil, air and vacuum circuit breakers to assure proper operation. |

# PPL Electric Utilities Corporation

| Program | Activity |
|---|---|
| Condition Monitoring of Station Equipment | Electricians/Technicians perform dissolved gas-in-oil analysis, dielectric, and physical properties oil tests for oil in power transformers, and impedance and select capacity tests on station batteries, to assure equipment is within normal parameters. Periodically, AC power factor tests, hi-potential tests, contact resistance tests and motion tests are performed on circuit breakers. Oil dielectric testing is conducted for oil circuit breakers. |
| Thermographic Inspections | Electricians perform infrared surveys of substation facilities to identify components operating at elevated temperature. Based on the findings, engineers develop plans to repair or replace the component(s) prior to failure. |
| Minor Improvements | Maintenance activities may identify conditions where additions or upgrades are needed to assure reliability. Engineers evaluate the need and develop action plans and schedules to complete the work. |
| DC Station Service Improvements | Repairmen identify deteriorated station batteries, battery chargers and battery components. Engineers schedule repair or replacement as necessary. |
| Capacitor Bank Protection | Engineers monitor the need for synchronous closing schemes on vacuum switches on 69kV capacitor banks. They plan and schedule installations as needed. |
| Area/Regional Supply | Engineers develop specific projects aimed at improving capacity shortfalls, or replacing deteriorated or substandard station equipment. |
| SCADA Replacement | Engineers identify deteriorating substation SCADA equipment and develop plans to repair or replace it. |

## *Appendix C: Distribution Programs and Procedures*

| Program | Activity |
|---|---|
| Load Survey<br>– of equipment that is not continuously monitored | Line personnel measure the loading of facilities during peak periods. Engineers use this data for system studies. |
| Load Survey<br>– by automatic monitoring devices | Automatic monitoring devices such as SCADA provide continuous, real-time loading information. Operators use this data to assure that loads do not exceed design limits. Engineers use this data for system studies. |
| Circuit Analysis | Engineers analyze circuit voltage profiles to balance loads and to identify areas requiring voltage support to maintain required voltage at the customer's facility. |
| Capacitor<br>– Inspection and Maintenance | Line personnel inspect and maintain associated electronic control equipment to assure proper operation. Line personnel repair or replace any defective equipment. |
| Voltage Regulator<br>– Inspection and Maintenance | Line personnel inspect existing equipment for potential failure, and inspect and maintain controls and tap changers to assure proper operation. Line personnel repair or replace any defective equipment. |
| Overhead Line Switch<br>– Inspection and Maintenance | Line personnel inspect switch installations to identify cracked or broken insulators / bushings, stuck or misaligned blades, insulation or gasket deterioration or other operational problems. Line personnel repair or replace any defective equipment. |
| Transformer Maintenance | Engineers analyze customer usage data to identify overloaded transformers. Transformers that are heavily loaded are replaced with higher capacity units or portions of the load are transferred to other nearby transformers. |
| Wood Pole<br>– Inspection, Maintenance, Reinforcement, Replacement | Inspectors examine wood poles for deterioration and measure the degree of decay. Based on the results, the pole may be treated with preservative to extend its life, treated and reinforced for extended life or replaced. |
| Overhead Line Inspection | Line inspection personnel examine overhead facilities to identify damaged, deteriorated or substandard equipment. Line personnel repair or replace any defective equipment. |

## PPL Electric Utilities Corporation

| Program | Activity |
|---|---|
| Circuit Performance Review | Engineers use PPL Electric's Circuit Performance Index to identify worst performing circuits and ascertain the need for additional circuit reviews or inspections. The improved index looks at a circuit's overall impact to system SAIDI. Actual service interruption history is analyzed to identify causal or geographic patterns. |
| Underground Primary Cable<br>– Testing, Maintenance, Replacement, Curing | Line personnel perform insulation and neutral tests on cable in residential developments with potential problems to identify deteriorated cable. Based on the results, the cable is placed back in service, repaired or replaced. |
| LTN Maintenance | Electricians inspect, service, maintain and overhaul LTN vaults, manholes, cables, transformers, low-voltage network protectors and primary transformer disconnect switches. Based on results, defective equipment is either repaired or replaced. |
| Public Damaged Facilities Review | A program aimed at identifying the locations of facilities that have been damaged by public contact more than once. Technicians evaluate those installations and, if relocation is deemed appropriate, schedule work to move the facilities. |
| Underground Service Cable | Engineers resolve customer service problems that are due to deteriorated underground service conductors. |
| Oil Circuit Reclosers | Line personnel replace in-service oil circuit reclosers on a time-based maintenance cycle. Removed units are tested, and may be refurbished and placed in inventory. |
| Line Protection Equipment | Line personnel replace in-service three phase oil circuit reclosers with communicating vacuum devices on a time-based maintenance cycle. |
| Capacitor and Voltage Regulator Installation | Engineers perform voltage profiles to determine the need, location and size of any new voltage support equipment required to maintain adequate service voltage levels at customer facilities and provide needed reactive support for system stability. Line personnel install the required equipment. |

# PPL Electric Utilities Corporation

## *Appendix D: Vegetation Applications*

| Program | Activity |
|---|---|
| Tree Pruning | Tree pruning is scheduled based on field conditions observed and/or a system prioritization process. All pruning is done in accordance with American National Standard for Tree Care Operations-Tree, Shrub and Other Woody Plant Maintenance – Standard Practices (ANSI A300). |
| Hazard Tree Removal | Trees located outside the right-of-way that represent a threat to line performance/ safety are removed when it is feasible to do so. |
| Herbicide Application | Tall-growing, undesirable vegetation growing within the right-of-way corridors is selectively treated with herbicides. Low-growing vegetation that does not represent a hazard to the safe, reliable operation of PPL Electric's facilities is preserved wherever possible. |
| Reclearing | Tall-growing, undesirable vegetation growing within the right-of-way corridors is selectively removed in those situations where herbicides can not be utilized. Low-growing vegetation that does not represent a hazard to the safe, reliable operation of PPL Electric's facilities is preserved wherever possible. |